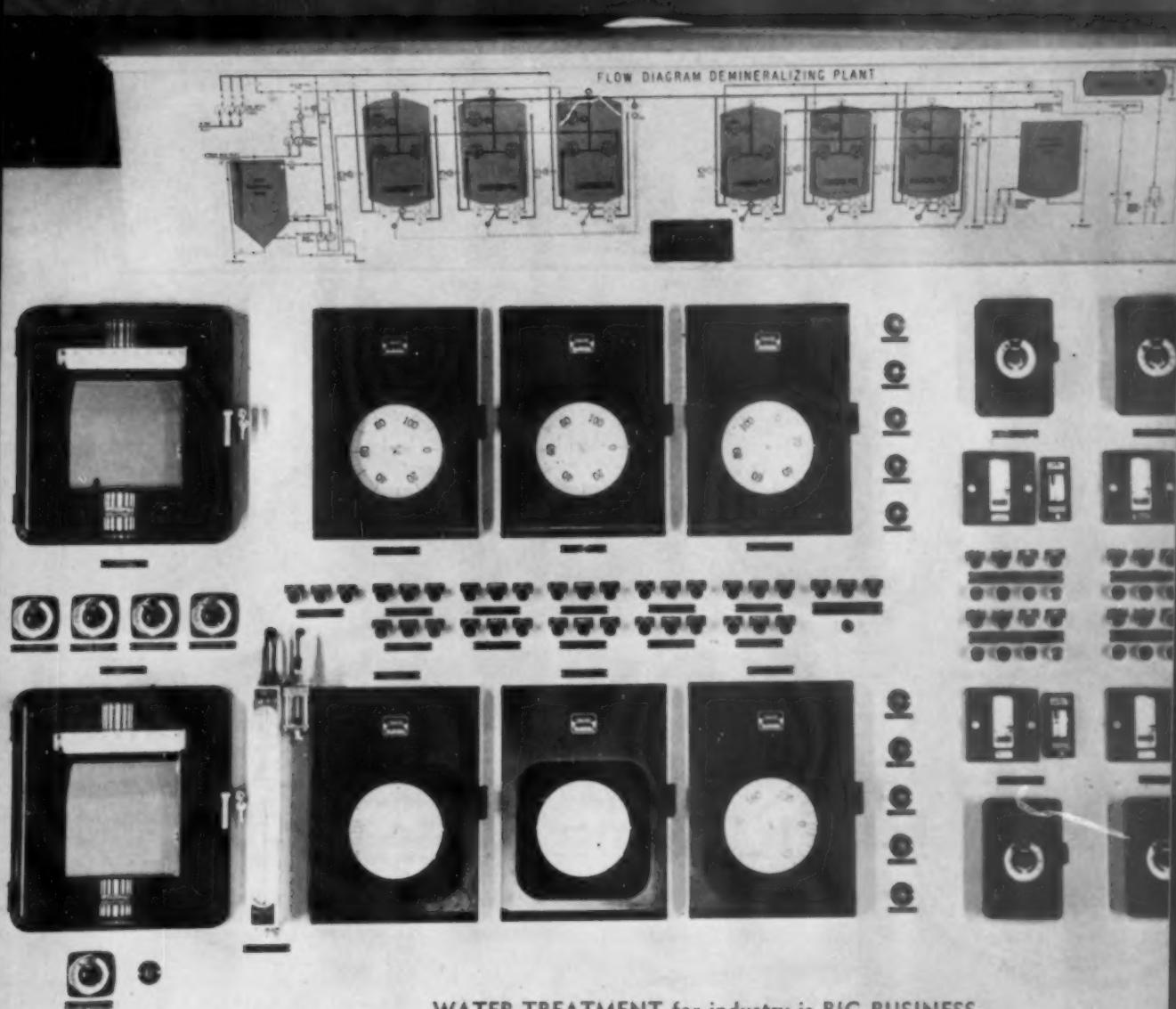


Southern Power & Industry

The Industrial and Power Journal of the South and Southwest



WATER TREATMENT for industry is BIG BUSINESS

The above photograph shows controls for a modern treating plant.
SEE Instrumentation for Water Treatment Plants page 40

COMING IN THE JANUARY ISSUE — A special section to help SPI readers with their water treatment problems: New Equipment, Catalog Listings and a Directory of Sales Representatives.

DECEMBER

1959



VOLUTE ASSEMBLY

STAINLESS STEEL LOOP



BULKHEAD PENETRATOR



Fabricated by Pittsburgh Piping for Nucleonics

These jobs demonstrate the variety of nucleonic piping work done in our shops. The volute assembly, shown in intermediate stage of manufacture, is fabricated of 14" and 16" Schedule 160 piping materials. The bulkhead penetrator, one of a group, is notable for an unusual method of welding dissimilar metals. The complex test loop requires skillful welding of stainless steel piping materials, and precise assembly of hundreds of components. We are equipped and staffed to do similar jobs for you. Telephone, or write and our representative will call. Or, we will be glad to have you visit our plant.

PIONEER FABRICATOR OF HIGH PRESSURE PIPING FOR NUCLEONICS



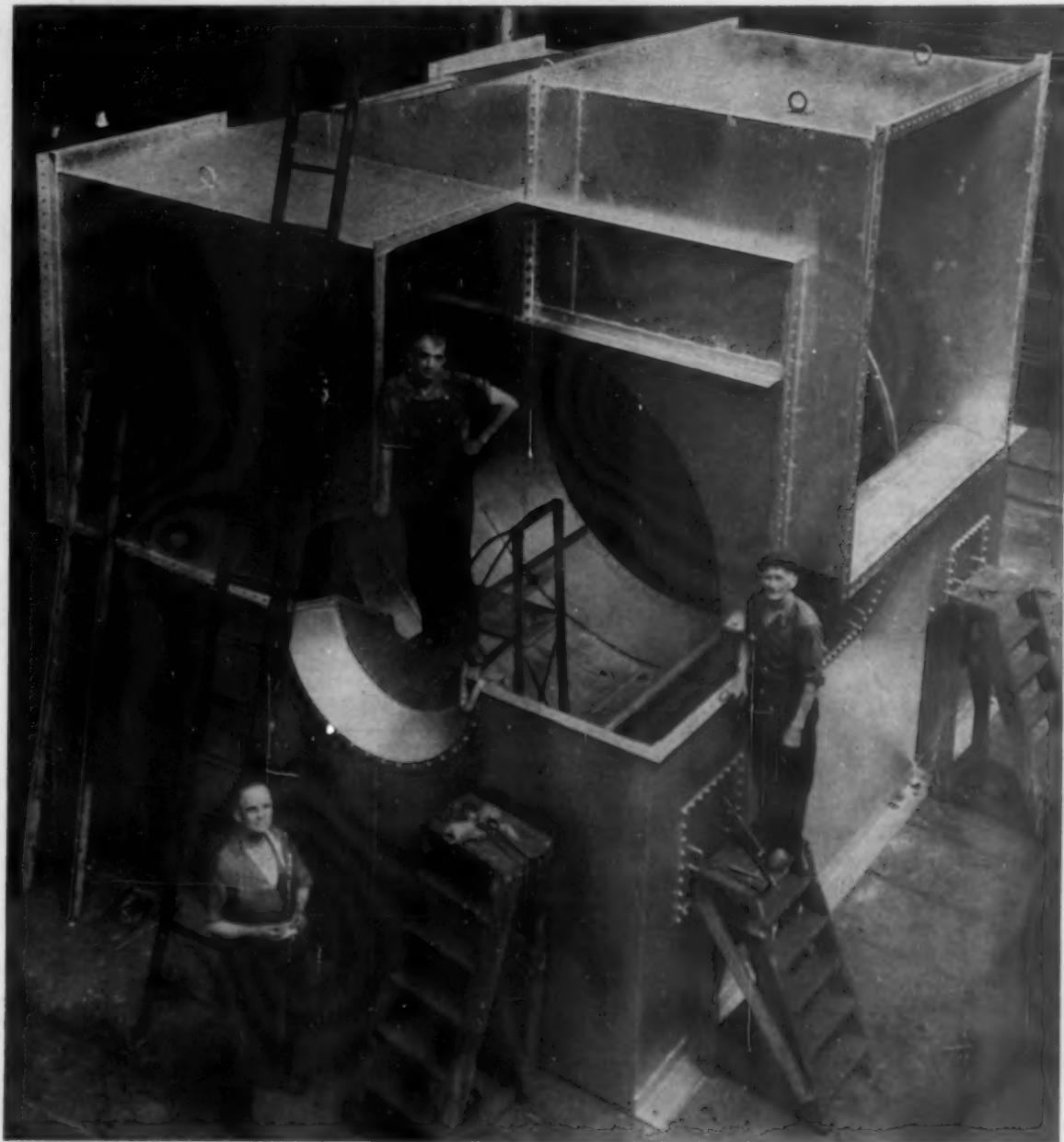
PP-40

Pittsburgh Piping

AND EQUIPMENT COMPANY

158 49th STREET • PITTSBURGH 1, PA.

Atlanta... Whitehead Building Cleveland... Public Square Building New York... Woolworth Building
Chicago... Peoples Gas Building New Orleans..... P. O. Box 74



**You wouldn't buy a bargain basement parachute...
or a cut-rate big game rifle...**

Don't choose less than Clarage quality for your mechanical draft service. With anything as vital as uninterrupted operation, it pays big dividends to get the best in equipment. Clarage, a specialist in building forced and induced draft fans, offers you equipment having a long-standing reputation for long-lasting service. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

SOUTHERN POWER & INDUSTRY is published monthly by W. R. C. Smith Publishing Co., Executive and Editorial Offices: 806 Peachtree St., N.E., Atlanta 8, Ga. Second-class postage paid at Charlotte, N. C. Subscription Rates: United States and Possessions, \$1.50 per year or two years for \$3.00; Foreign Countries, \$10.00 per year.

Maintenance and Steam Traps

... there's a relationship that goes far beyond trap maintenance alone

Good traps and good trapping have a greater effect on your maintenance costs than does trap maintenance itself. By that we mean that the right traps, properly selected and installed, and with the benefits of a preventive maintenance program, will save far more maintenance dollars than they will cost.

Under the pressure of spiralling maintenance costs, this thought becomes mighty important. Let's take a look at what it involves:

Proper Selection of Steam Traps

1. Be sure it's the right type of trap.
2. Be sure it's sized right and is for the correct operating pressure.
3. Be sure it's first rate in design and construction.

Proper Installation of Steam Traps

1. Install them so they are accessible for inspection and maintenance.
2. Install a test valve.
3. Use a union or unions.
4. Use a shutoff valve or valves.
5. Use a strainer ahead of the trap if dirt conditions are bad.
6. Use a by-pass only where continuity of service is imperative.
7. Standardize inlet and outlet connections.

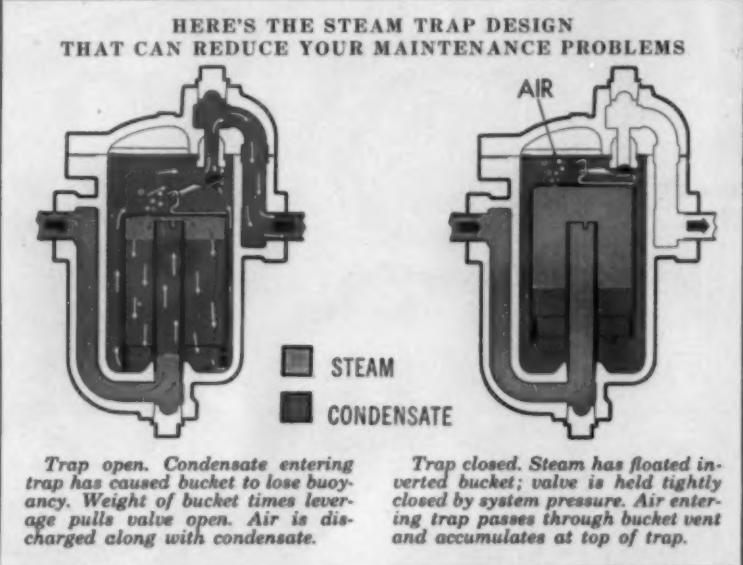
Preventive Maintenance Program

1. Test trap regularly for proper operation. (Trap size, operating pressure and importance determine frequency.)
2. Inspect internal mechanism at least once a year.

You Get Indirect Benefits As Well

The direct benefits of the plan outlined are pretty obvious — good traps, properly selected, require less maintenance . . . testing and inspection prevents troubles that lead to maintenance.

However, this plan provides indirect benefits which reduce maintenance in other parts of the plant as well:



burning equipment and on ash handling equipment.

Good traps protect the system by eliminating water hammer and preventing the damage it can do.

Good traps discharge carbon dioxide before it can go into solution to form corrosive carbonic acid — less corrosion, less maintenance.

Good traps increase production to reduce the length of time equipment must operate or reduce the amount of equipment needed . . . either way maintenance is reduced.

How to Go About It (The Sales Pitch)

We admit we're prejudiced, but we don't think there is any better way to select steam traps than with the help of the 44 page Armstrong Steam Trap Book. Here in a single source is specific data on the selection and sizing of traps, how to install them for best results, and how to maintain them most economically.

The Steam Trap Book will also give you full information on the design and construction of Armstrong Inverted Bucket Steam Traps that offer these important maintenance-reducing advantages:

1. Armstrong Traps are dependable.

2. Armstrong Traps require no adjustments — go from full load to zero load automatically.

3. Armstrong Traps are self-scrubbing—ordinary dirt conditions can't hurt them.

4. Armstrong Traps have long-life parts — valve and seat are heat treated chrome steel — lever assembly and bucket are stainless steel.

5. Armstrong Traps have water sealed valves to minimize wire drawing and erosion.

Ask for your copy of the Steam Trap Book—there is no obligation. Then test Armstrong Trapping. If you are not completely satisfied with the results, you can return the traps for a full refund of the purchase price. You can't lose much that way. Call your local Armstrong Representative or Distributor, or write

Armstrong Machine Works

8066 Maple Street
Three Rivers, Michigan



ARMSTRONG
STEAM TRAPS

"See our catalog in Sweets' Plain Engineering File"

IPPA**NBP**

Southern Power & Industry

The Industrial and Power Journal of the South and Southwest

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Vol. 77
No. 12

DECEMBER, 1959

New Marketing Concepts for Electrical Manufacturers	28
Can Industrial Leaders Meet Challenge?	30
Planned Maintenance Pays for Chatham at Elkin, N. C.	32
Job Evaluation That Sells Itself	36
Fuel Cells Develop 15 Kilowatts	38
Instrumentation for Water Treatment Plants	40
Power Generation — Trends and Challenges	44
Double Feature Trap Aids Production	54
Stimulating Water Wells — Texas Report	58
New Tennessee Plant Makes Five Products	62
Top Cover Florida Pipeline	35
Motor Rotation Indicator	63
Dual Purpose Guard Rail	39
Texas Plant Saved \$5,000	66
Universal Positioning Fixture	50
Lubrication Truck	66
Wrought Iron Trash Rack	60
Gas Diluter System	68
Production Line Straightened	63
An Air Tight Case	68
Facts & Trends	4
Timely Comments	30
News of the South	14
New Product Briefs	70
Future Events	24
Catalogs & Bulletins	80
Industry Speaks	28
Index to Manufacturers	94

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Printed in U.S.A.

SOUTHERN POWER & INDUSTRY for DECEMBER, 1959



Facts and Trends

December 1, 1959

- ◆ STANDARD PALLET SIZES — Discussing the new American Standard on pallet sizes, which has just been published after five years of committee work, J. E. Wiltrakis of Western Electric Company stressed the vast field of application of this new standard.

Instead of the more than 300 pallet sizes now in use, the new standard provides a series of only 11 — eight rectangular and three square. For the future, standard pallets are visualized as a basis for integrated distribution and storage systems — automated storerooms where pallet loads will be recorded automatically during transport in and out, and also to and from carrier and to and from work positions. Send 50¢ to American Standards Association, 70 E. 45th St., New York 17, N. Y., for copy of Mr. Wiltrakis' speech.

- ◆ CONTAINERIZATION — Wider use of containerization in freight shipments to substantially cut transportation costs and reduce overall marketing expenses was urged at the American Management Association's Conference on Distribution Management.

L. E. Galaspie, president of the Associated Traffic Clubs of America and director of traffic for Reynolds Metals Company, said that transportation costs make up to 20 per cent of the final selling price of many goods now on the market. An additional large portion of the price comes from handling and rehandling in the factory and along the route. These costs could be sizeably trimmed in most cases through use of shipping containers which reduce the number of units handled.

- ◆ CORROSION RESISTANT VALVE — A new ball valve for piping systems which is made almost completely of Geon rigid vinyl promises to be the answer to corrosion problems in handling oils, acids, alkalies, and most chemicals. Developed by the Jamesbury Corp., Worcester, Mass., the valve is effective either at full pressure or vacuum and requires no lubrication. Geon is a product of B. F. Goodrich Chemical Company.

- ◆ LASTING MUFFLERS — The car owner's dream of a muffler that will outlast today's and tomorrow's cars will be a reality before year's end if progress on a cast aluminum muffler reported by Centr-O-Cast and Engineering Company and Reynolds Metals Company continues as scheduled.

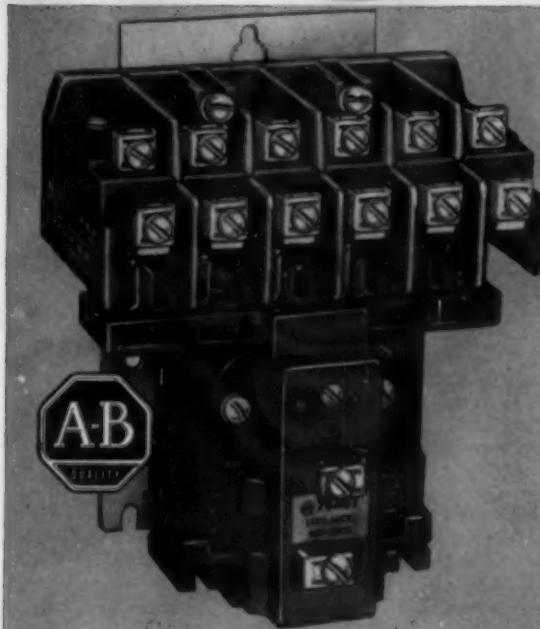
The muffler, designed to eliminate need for replacement and dual exhaust systems, is competitive in cost and will reach the market weighing only 60 per cent as much as the present short-life mufflers that last less than two years.

- ◆ UNSECURE SECURITY — Social taxes will jump again January 1 to a total of 6 per cent on the first \$4,800 of earnings, bringing another reminder that today's workers who expect to benefit from Social Security in their old age are depending on future taxes rather than an assured reserve fund.

Many persons believe that the 3 per cent social tax deducted from their paychecks (and few of them realize the employer pays an additional 3 per cent) is buying some kind of an "insurance"

(Continued on Page 6)

IT'S NEW



Bulletin 700 Type BR Relay with all six of the convertible poles arranged for normally open contact operation.

Allen-Bradley Convertible Contact CONTROL RELAY

BULLETIN 700

TYPE BR

Changeover made in seconds!

The contacts of the new Type BR relay can be arranged for either normally open or normally closed operation—and any changeover in the field can be made in seconds. A screwdriver is all that's needed.

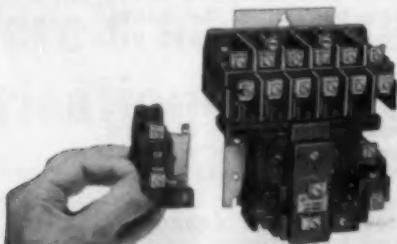
This new A-B Bulletin 700 Type BR relay is ideal for use on automatic machines where control functions are frequently altered to meet production changes.

Quick convertibility of the contacts enables easy "on-the-spot" changes—from "normally open" to "normally closed"—or vice versa.

These new Bulletin 700 Type BR relays have been exhaustively tested to make sure that they will provide

the many millions of trouble free operations for which all A-B controls are famous. In fact, the Bulletin 700 Type BR relays will establish new standards for long relay life and "reliability" of contact operation. Of course, they have double break, silver contacts that never need attention; also, the cast-plastic coil is impervious to the most severe atmospheric conditions.

Please write for full details, today!



ALLEN-BRADLEY | QUALITY MOTOR CONTROL

Allen-Bradley Co., 1328 S. Second St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

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SALT LAKE CITY—Stevens Sales Co., 1482 Major St., Tel: INgersoll 7-5489
SAN DIEGO—James A. Setchell, 301 W. "G" St., Tel: BELmont 3-3981
SHREVEPORT—Curtis H. Stout, Inc., 409 Fairfield Bldg., Tel: 5-5485
TULSA—John W. Eider Co., 1526 East Fourth St., Tel: Diamond 3-9149

Facts and Trends — Continued from Page 4

policy or annuity which automatically guarantees them benefits whenever they become eligible. The truth is, Social Security is not insurance. No one buys any benefits for himself. Social Security is simply a method of taxing those who work, to pay benefits to those deemed no longer able to work. If the taxes stop, payments stop.

- ◆ **TEACHING EMPLOYEES** — Melpar, Inc., Falls Church, Va., a subsidiary of Westinghouse Air Brake Company and a leader in research, development and production of electronic equipment for government and industry, is sponsoring 17 In-Plant Engineering and Mathematics courses in conjunction with four leading Washington and Northern Virginia educational institutions.

The In-Plant courses conducted by four institutions are available to all full-time Melpar employees and are covered by its Tuition Reimbursement Plan. Courses include basic and specialized engineering subjects.

- ◆ **REPORTS ON CERAMICS** — A new Catalog of Technical Reports listing all reports of research in the fields of ceramics and refractories available to the public from the collection of the Office of Technical Services, U. S. Department of Commerce, has just been published.

Included in the 21-page listing are reports dealing with ceramic, enamel, and refractory coatings, and the high-temperature and electrical properties of ceramics. The catalog, CTR-373 Ceramics and Refractories, 1930-1959, may be ordered from OTS, U. S. Department of Commerce, Washington 25. Price is 10 cents each.

- ◆ **EMPLOYMENT PRACTICES** — An "Industrial Professional Development Award" is to be presented annually by National Society of Professional Engineers, beginning with the Society's meeting in June, 1960, to the industrial employer of engineering personnel that has made an outstanding contribution to the advancement and improvement of the engineering profession through its employment practices.

The purpose of this award is: (1) to give adequate recognition to the industrial firm which has shown outstanding advancement and improvement in the development and application of forward-looking engineering employment practices; and (2) to encourage all industrial employers of engineering personnel to adopt progressive engineering employment practices in accord with established professional standards.

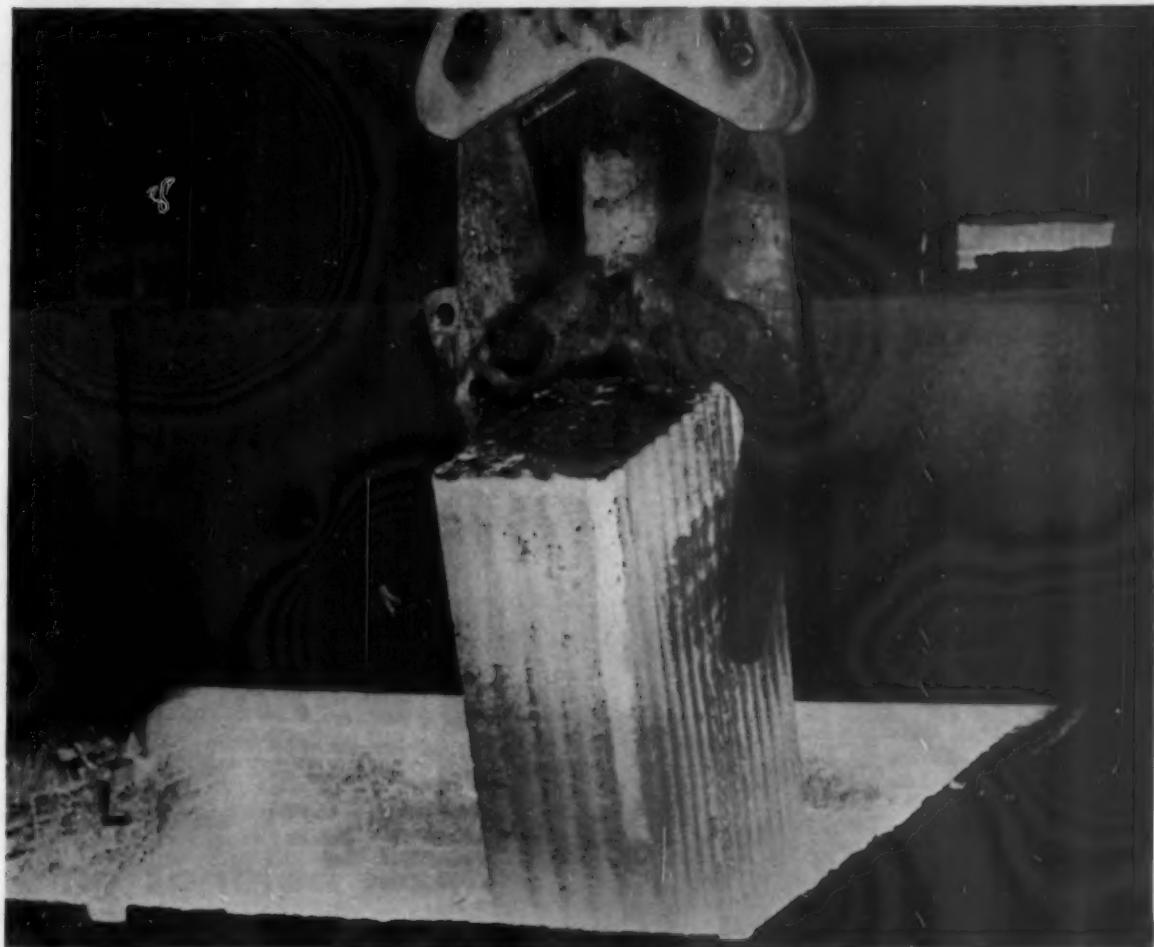
- ◆ **TAX REVISION** — The month-long study before the House Ways and Means Committee promises to be the first major review — looking toward general revision of our tax laws — that we've had in about a century, according to some analysts.

Such a study is long overdue. Not since 1954 has Congress looked critically at our cumbersome income-tax structures, and action then produced more patching than basic planning. Tax depreciation policy still is strongly colored by an out-moded 1934 Treasury ruling. Some aspects of the jerry-rigged revenue system never have been studied as integrated parts of the whole.

- ◆ **WHERE YOU STAND UNDER THE LABOR REFORM LAW** is a simplified explanation of the major provisions of the Labor-Management Reform Law of 1959. Prepared by BNA's labor staff, this handy 16-page booklet is announced for publication. Write The Bureau of National Affairs, Inc., 1231 24th Street, N.W., Washington 7, D.C., for quotations in quantities for employee distribution — about 10¢ each, depending on number of copies purchased.

(Continued on Page 10)

THE TOUGH JOBS COST LESS WITH PREMIUM LUBRICANTS



YOUR HIGH-TEMPERATURE LUBE PROBLEM was probably solved right here. Bearing temperature in these pincers approaches 1,000°F at high bearing

pressure. Only Thermatex could lubricate successfully under this combination of conditions. Get the details from a Texaco Lubrication Engineer.

Here's an answer to high-temperature lubrication that you can use in your plant

Have you got a problem lubricating bearings that must run at temperatures of 500°F or more—or in ambient non-constant temperatures of 1,000°F or more? Kiln cars, perhaps? Or rollers handling hot ingots—or bearings on a roasting furnace? A new Texaco grease, Thermatex, has solved these problems, and many others, too. It probably can solve yours. Why? Because:

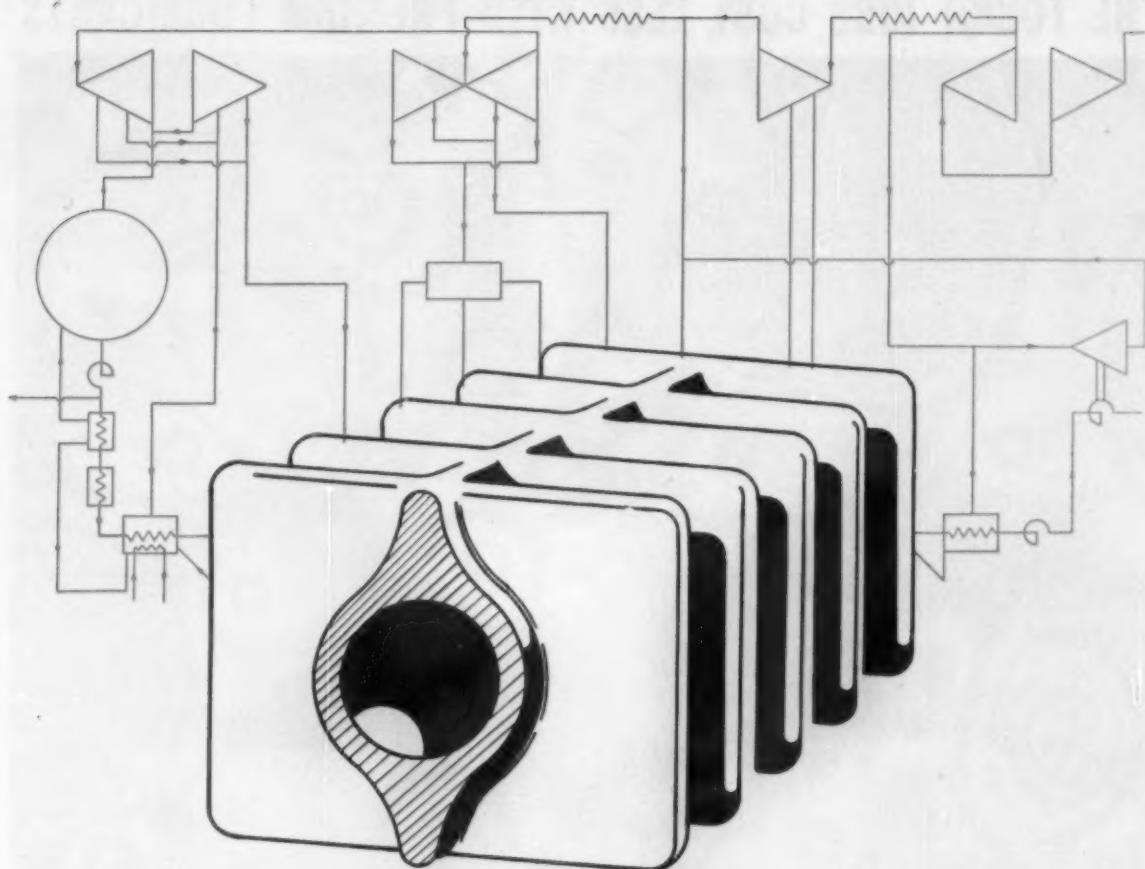
Thermatex is a unique new product that lubricates dependably even at temperatures of 500°F and higher—with a tough lubricating film that's proof against extremely high pressures.

In the cases we've cited, Thermatex made the whole difference between bearing service and bearing failure. If you've got a lube problem that's too hot and too heavy for any ordinary lubricant, try premium-grade Thermatex.

Thermatex is just one example of the fact that the tough jobs cost less with premium lubricants. However specialized your problem, a Texaco Lubrication Engineer can supply you with an answer. Just call the nearest of the more than 2,300 Texaco Distributing Plants, or write Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Texaco Huntley-Brinkley Report, Mon.-Fri.-NBC-TV

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Throughout the United States
Canada • Latin America • West Africa

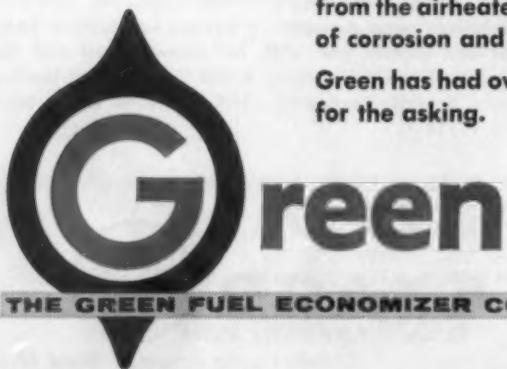


Green's Low-Level Economizer belongs on your steam cycle flow diagram!

Why has Green's Low-Level Economizer already been purchased for inclusion in several large units scheduled for operation in 1960, 1961 and 1962?

1. It is accepted that low-level heat recovery offers the most economic method of obtaining the lower heat rates required today.
2. Flue gas-to-water heat exchange transfers the low temperatures from the airheater to the Low-Level Economizer where the problems of corrosion and plugging can be adequately resolved.

Green has had over 100 years of economizer experience. It is yours for the asking.



BEACON 3, NEW YORK

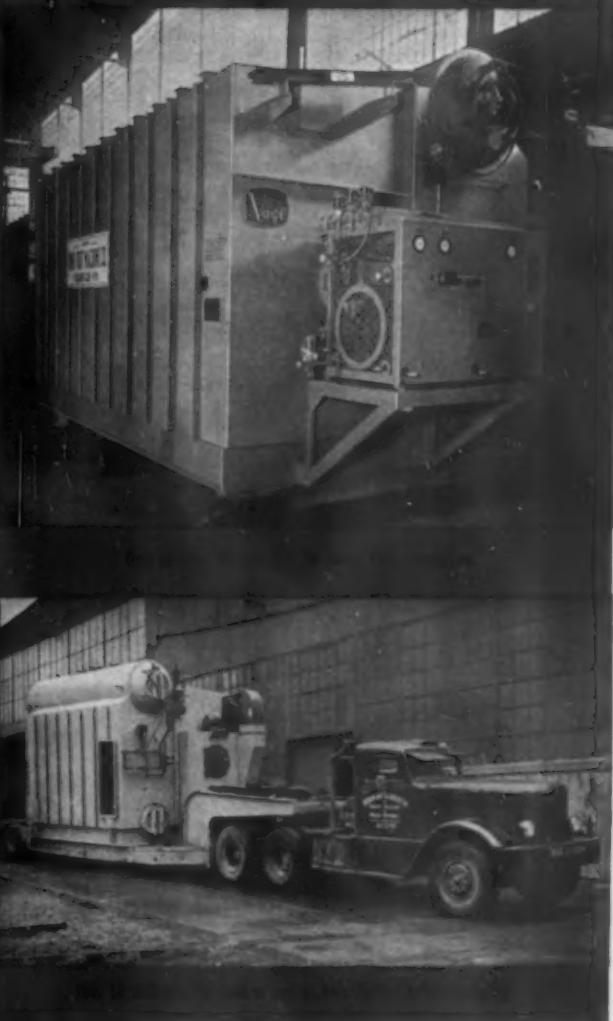


More Steam per dollar of investment with **Vogt**

PACKAGE WATER TUBE BOILERS

Completely shop fabricated, with burners, controls and accessories installed before shipment.

Placed on a suitable foundation, only fuel, water, breeching and steam connections need to be made to place unit in operation. Vogt Package boilers are available in oil and/or gas fired types in standard pressures of 175, 250 and 375 pounds per square inch gage.



Facts and Trends — Continued from Page 6

- ◆ **SEVERANCE PAY** — Approximately half of America's manufacturing companies employing more than 1,000 persons have some type of severance pay arrangement for employees whose service is terminated at the behest of management, the National Industrial Conference Board reports in a recent study.

However, the prevalence of the practice differs widely from industry to industry. Estimates of the proportion of the larger companies having severance pay plans range from 94 per cent in the rubber industry to 56 per cent in textiles. Severance pay becomes more common as company size increases, but there also are marked differences in this relationship among the seven types of industries studied.

- ◆ **FUEL CELL** — You have seen items in the papers about the Allis-Chalmers experimental fuel cell tractor (there is a brief article also in this issue), but have you considered the full importance of this accomplishment?

Small as it is (15 hp) — and still experimental — this may well be more important (granting peace on earth) than nuclear-onics. The fuel cell can now produce electric power direct from fuel, without heat and with no moving parts, at near 100% efficiency. The best internal combustion engine can only approach 40% efficiency, and even then a generator must be added to produce electricity.

- ◆ **GET THE BUGS OUT** — Now, according to Consolidated Paint & Varnish Corp., any room or building can safely be made insect proof. The company is marketing Kil-Sect, a wall finish combining the beauty and service of the finest alkyd paint with the latest advance in the field of insecticides.

"When insects touch a surface covered with Kil-Sect, some species die instantly, others in a matter of minutes — but none survive. At the same time, there's no danger to children or pets." The insecticide used is dichloro diphenyl dichloroethane (DDD). It is a far stronger insecticide than DDT, and it remains suspended in the paint for permanent effectiveness.

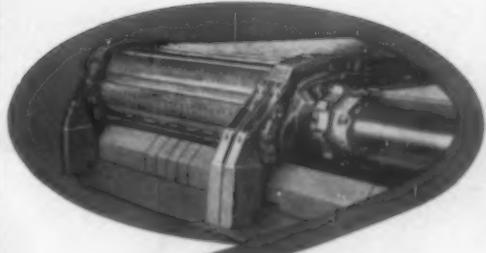
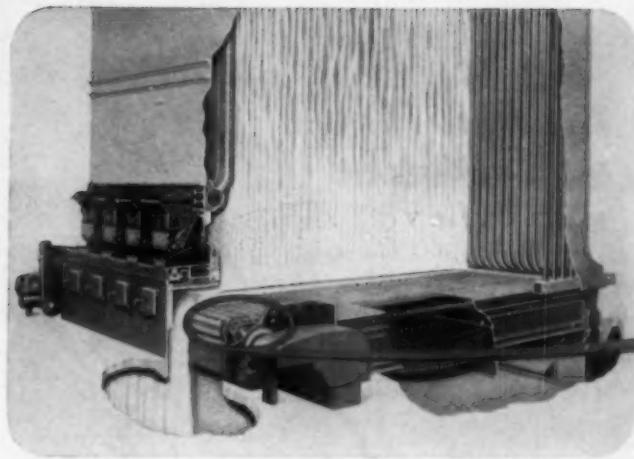
- ◆ **FEWER RIVETS NEEDED** — High strength bolts have almost completely replaced rivets in building and bridge construction in the field according to Edward R. Estes, Jr., of the American Institute of Steel Construction, speaking at the Tenth National Conference on Standards, sponsored by the American Standards Association.

For the future, Mr. Estes predicted that working strength of high strength bolts will be increased. "Other research has shown it may be possible to eliminate the washer in high strength bolt assemblies," he added. "It may be that in another eight years use of the rivet will be as much a rarity in the shop as it is today in the field."

- ◆ **REPRINTS** — Because requests are still coming in at a lively pace, the editors have delayed sending their remaining stock of three important reprints to dead storage: "Paint Systems," "Material Handling Case Studies" and "The Chemist's Inspection Reports." We also have reprints of the plant description of the "New Gas Turbine Generating Unit" at Monroe, La.

If you want a copy of one or all, please write promptly so we won't have to go into that old dark storeroom to dig them out.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 8, Ga.



Long grate bars with closely fitting overlay joints prevent leakages. Venturi air openings are spaced to provide uniform air distribution.

GRATES ARE THE OF A STOKER DETROIT ROTOGRADE HAS PLENTY OF INTESTINAL FORTITUDE

No matter what else it has, no stoker can be a complete success without trouble free efficient grates.

The Detroit RotoGrate Stoker has other outstanding features in abundance but without the superior grate design it could never have achieved such instant and lasting success.

The advent of the RotoGrate Stoker established a whole new trend in coal firing and stimulated many competitors but none has seriously challenged the superior performance and long life of the RotoGrate.

Our grates are high resistance metering type with venturi air openings spaced to provide uniform air distribution. Long grate bars have close fitting overlay joints to prevent leakages that cause blow holes and burnouts.

Sturdy construction and use of special alloy iron makes these grates long lasting under the most exacting service.

GUTS

Guide chains riding over toothed sprockets assure positive grate bar alignment. A unique method of attachment avoids chain wear and stretching, while the catenary take up of slack prevents jamming.

Forward travel continuously discharges ash. Automatic combustion control varies the speed of travel in step with fuel feed rate to maintain uniform fuel bed while following fluctuations in load.

Burns all grades of bituminous and lignite coals, also many kinds of refuse and by-product wastes.

The RotoGrate for boilers to 400,000 pounds steam per hour capacity; other Detroit Stokers for capacities from 3,000 pounds steam per hour.

DETROIT STOKERS COST LESS

Cost equals initial investment plus upkeep plus production losses due to equipment outage. The total is less with Detroit.

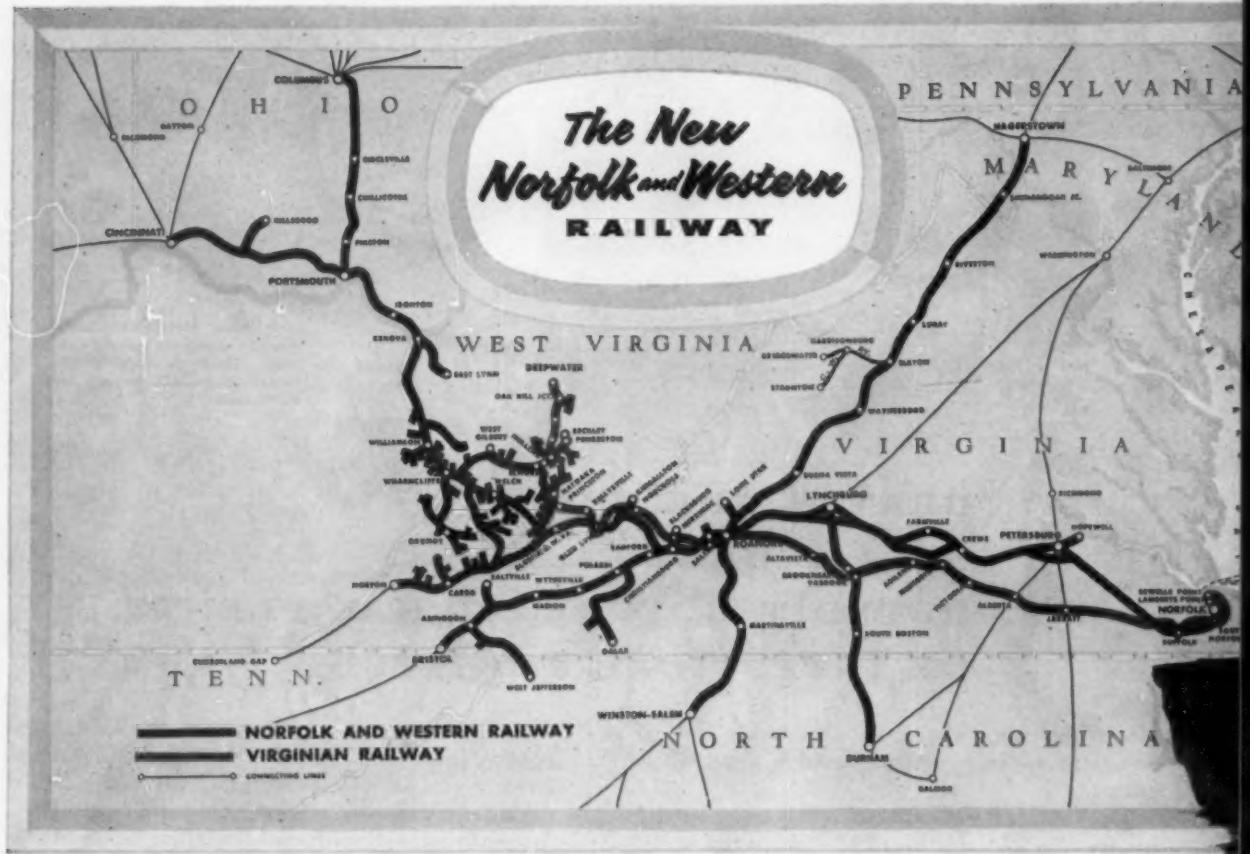
Even distribution of air is
assured by metering type
air openings.



DETROIT
SINCE 1898
STOKERS

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MAIN OFFICE AND WORKS • MONROE, MICHIGAN

District Offices or Representatives in Principal Cities



this is today's Norfolk

The first merger of two major, independently operated railroads in modern times is a reality. The historic merger of the Virginian Railway into the Norfolk and Western Railway has been approved by the Interstate Commerce Commission.

The bigger, stronger and more efficient Norfolk and Western has two principal objectives. First, the railroad will provide more efficient and improved service to the coal industry and users of coal, and to other industry and business along its lines and throughout the nation. Second, it will make available to industry a number of choice new plant sites. The territory of these sites will offer industry an abundance of low-cost power, ample industrial water, huge supplies of superior, all-purpose Bituminous Coal, high quality limestone and a great variety of other raw materials; nearness to the big consuming markets of the Southeast, Middle West

and North, and overseas markets through the modern ice-free Port of Norfolk on famed Hampton Roads, plus stable, home-rooted manpower, reasonable taxes and communities that are friendly to industry. With an enlarged and strengthened industrial development department, the railroad will go all out to attract new industries to the expanded territory of the six progressive states it serves.

The merger of the two railroads makes the Norfolk and Western one of the financially strongest and most efficiently operated trunk lines in the United States, with excellent connections to the four points of the compass. This strategically

Norfolk



Two Great Railroads to Become One



and Western...On the Go!

located rail system has 2,747 miles of road, 5,870 miles of track . . . nearly a billion dollars in assets . . . 81,000 freight cars — more freight cars per mile of line than any other railroad in the United States 250 miles or more in length . . . the nation's newest and most modern fleet of diesel locomotives . . . up-to-date signalling and communications systems . . . huge Tidewater terminals and many other top-notch facilities.

Physical consummation of the two railroads with extensive improvements will get underway as soon as possible. The Norfolk and Western looks forward eagerly to taking full advantage of the bright opportunities in the dynamic years ahead.

and Western Railway

Statement by Stuart T. Saunders, N & W President:

"The Interstate Commerce Commission's approval of the merger is a landmark decision which signals a new day in the progress and development of greater efficiency and better service by the combined railroads. It reflects a farsighted viewpoint on the part of the Commission and a sympathetic interest in solving one of the major problems which confront the railroad industry today — the elimination of duplicating and unneeded transportation facilities and services. The Norfolk and Western expresses sincere appreciation to those progressive industries and individuals, civic groups and other organizations whose wholehearted endorsement helped to make this historic merger possible. It is an invigorating challenge, and opens a new era for the new system. The bigger, stronger and more efficient Norfolk and Western is on the go. The railroad has the facilities, the know-how, the determination and vigor to meet the challenge — to do the job."



the SOUTH—SOUTHWEST

more power . . . more plants . . . more money



New Plant for Duncan Coffee Co. — Houston

The Duncan Coffee Company, maker of Maryland Club, Admiration, and other brands, has announced plans for a new plant and offices to be built on a 26-acre tract in one of Houston's newest industrial districts.

The plant will cost in excess of \$3 million and is scheduled for completion in the late Fall of 1960.

The company's operations currently encompass 12 states. The Houston plants will be consolidated at the new plant, and the plant in Corpus Christi will continue in operation.

The ultra modern office, plant, and transportation facilities will be of concrete and masonry construction. The three structures will provide a working area in excess of 210,000 square feet.

The new plant will incorporate the latest technological developments for both research and production. Equipment for handling, roasting and blending will include every proven advance known to the world coffee industry. Electronic controls will be incorporated throughout all processing and quality control, assuring continuous uniformity of product quality.

From automatic controls to a special "cupping room," the new plant has been designed throughout to permit an exceptional degree of quality control. The plant will be

organized to permit samples of each roast of coffee to be continuously tested throughout each day's processing and packaging operations. The purchase of green coffee, blending and complete quality control are under the supervision of Mr. Almond Power, a veteran of some 17 years' experience.

The company has an annual payroll of approximately \$2.5 million, with more than 320 employees.

Georgia Power Co. Dedicates Oliver Dam

Dedication of the Georgia Power Company's new \$14,410,000 hydroelectric generating plant on the Chattahoochee River at Columbus took place on Nov. 12.

Guest of honor was James M. Oliver, for whom the dam is named. Mr. Oliver is a veteran of 44 years' service with the Alabama Power Company and Georgia Power Company.

The newly completed 60,000-kilowatt Oliver Dam is the company's second most powerful hydroelectric installation on the Chattahoochee, being exceeded in generating capacity by Bartlett's Ferry.

The eight and one-half mile long lake created by the dam covers 2,400 acres. A portion of the lake is within the Columbus city limits, and the Georgia Power Company is providing the City of Columbus with lakefront property for use as a re-

creational park and for access to the lake.

Mr. Oliver, who retired from the Georgia Power Company in February as executive vice president and general manager, is a native of Dadeville, Ala. He was graduated from Auburn in 1915 with the degree of bachelor of science in electrical engineering. He came to the Georgia Power Company as operating manager in 1927 after serving 12 years with the Alabama Power Company. Mr. Oliver is an honorary director of the Georgia Power Company. He is a member of the Georgia Engineering Society and holds a lifetime membership in the American Institute of Electrical Engineers.

Reynolds Metals — Va.

Reynolds Metals Company's new plastics plant at Grottoes, Va., has swung into full-stream production and is now making a full line of polyvinyl chloride and polyvinyl alcohol films under the trade name, "Reynolon."

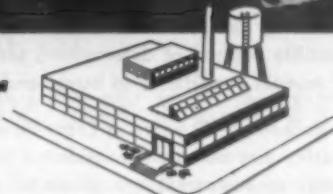
The Grottoes plant was purchased from Duplan, Inc., in 1956 and Reynolds' plastics division was moved from its crowded quarters in Gary, Ind. to the 124,000 sq ft of floor space which provided ample room for the expansion program which has just been completed. The facility's 63-acre site will make possible future development. Richard M. Chamberlain is plant manager.

Anderson Electric — Ala.

Plans have been completed for a new home office building for Anderson Electric Corporation, Birmingham, Alabama, to be erected adjacent to the company's aluminum casting foundry at Leeds, Alabama, a Birmingham suburb. Of contemporary design, the two-story brick and steel building will contain a total of 13,000 sq ft. It will house Anderson's sales, engineering, accounting, production control departments and executive offices.



brought to your door



Now you can have scale, rust, grease and other objectionable deposits removed from your boilers, condensers and other heat exchange equipment. An Anderson Chemical Company mobile cleaning unit will come to your plant, anywhere in the Southeast, and remove those unwanted deposits. The special equipment and technical knowledge required are brought to you at a time when your equipment can be out of service for 24 hours without hampering production.

The Anderson Emergency Chemical Cleaning Service does not require long shutdowns for your equipment to be dismantled and re-assembled. First, an Anderson service representative will have your scale and

rust problems analyzed by an experienced laboratory staff. Then a proposal will be made to you without obligation. On a scheduled date of your choice the mobile unit and a service representative will come to your plant and conduct the entire operation. The *field-proven* cleaning methods used assure maximum protection of your equipment during the cleaning process. You'll find the cost very reasonable with satisfactory results guaranteed.

But the Anderson service doesn't stop there . . . one of their trained service representatives will help you *keep it clean* by outlining a simple preventative maintenance program.

For complete details and an analysis of your water treatment problems, write today. There is no obligation.

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YOU CAN'T BUY A MARLEY CLASS 600 DOUBLE-FLOW *that won't meet performance*

Full-performance towers are as ethically fundamental as "twelve bananas to the dozen." That is why Marley zealously conforms to this single standard: "You can't buy a Marley Class 600 Cross-Flow that won't meet performance."

That is why an important part of every Marley Class 600 Double-Flow or Single-Flow proposal reads: "Every purchaser is urged to make thermal performance tests of his Marley tower." Each year more cooling tower buyers are including test provisions in their specifications as the one possible method of determining satisfactory performance—of mutual importance to buyer and builder.

Backed by 20 years of Cross-Flow performance research, Marley has complete confidence in its selections for any duty, so customers are given all necessary assistance to facilitate testing by whatever standard is selected. Tests conducted by Marley engineers are scheduled promptly and must receive customer's full concurrence.

Marley welcomes tower tests as an opportunity to present the quality of Class 600 towers to industrial purchasers by publishing annually the consecutive results of the year's testing program. ALL test results are made public—none are deleted.

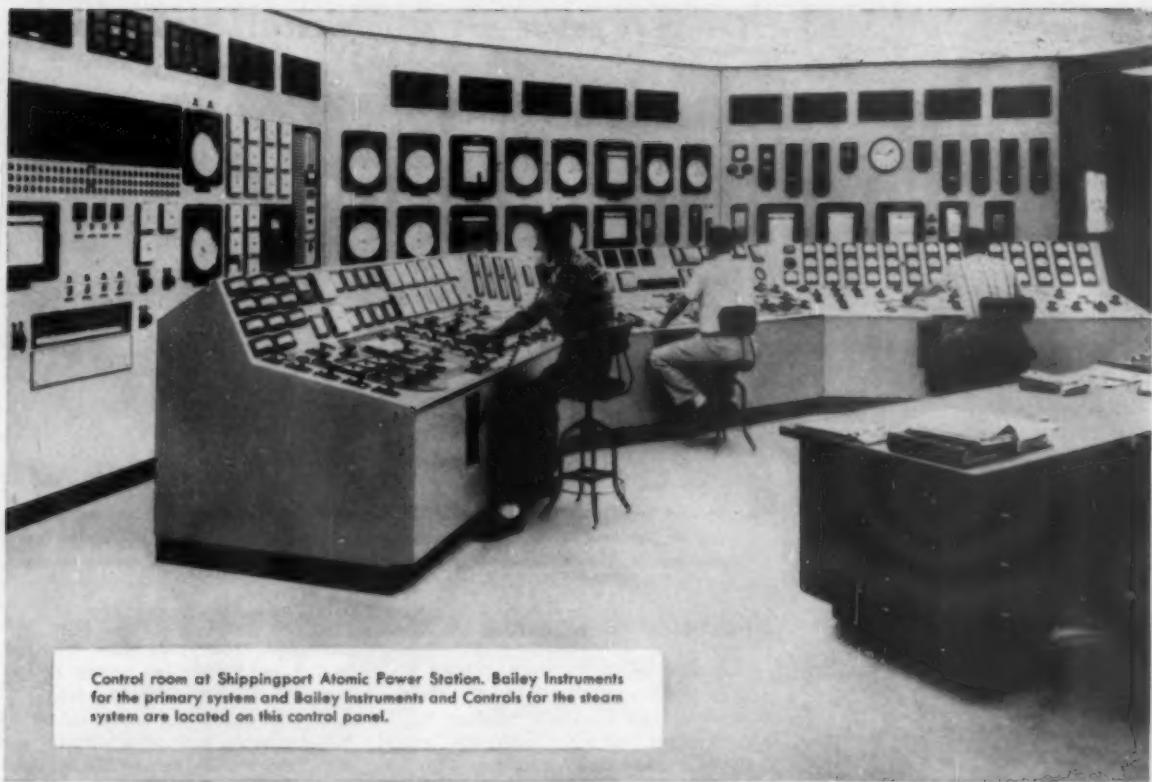
During 1958, 22 tests were conducted. Of these, 18 indicated capacity in excess of specification. Four tests were deficient, the greatest deficiency being only 10% below water temperature specified. The Marley guarantee provides that these four towers be modified to deliver full performance without added cost to the owner.

Your Marley sales engineer will be glad to supply you copies of these results; also Marley's "Test Your Tower" and "Analyze Your Bids". If more convenient, request them from



The Marley Company

Kansas City, Missouri



Control room at Shippingport Atomic Power Station. Bailey Instruments for the primary system and Bailey Instruments and Controls for the steam system are located on this control panel.

Bailey pioneers the control of... ATOMIC STEAM POWER PLANTS

This control room is the center of operations for the world's first full-scale atomic, electric power plant devoted exclusively to civilian use—the Shippingport Station, jointly owned by Duquesne Light Company and the Atomic Energy Commission.

Here, as well as on the atomic-powered submarines, are Bailey Instruments and Controls performing dependably hour after hour, month after month.

In conventional power plants, too, Bailey Meters and Controls are standard equipment. Bailey is the choice of virtually all the most efficient plants on the Federal Power Commission's heat rate report. Here's why:

1. A Complete Line of Equipment

You can be sure a Bailey Engineer will offer the right combination of equipment to fit your needs. Bailey manufactures a complete line of standard compatible

pneumatic and electric metering and control equipment that has proved itself. Thousands of successful installations involving problems in measurement, combustion and automatic control are your assurance of the best possible system.

2. Experience

Bailey engineers have been making steam plants work efficiently for more than forty years. Veteran engineer and young engineer alike, the men who represent Bailey, are storehouses of knowledge on measurement and control. They are up-to-the-minute on the latest developments that can be applied to your problem.

3. Sales and Service Convenient to You

There's a Bailey District Office or Resident Engineer close to you. Check your phone book for expert engineering counsel on your steam plant control problems.

A136-1

Instruments and controls for power and process

BAILEY METER COMPANY

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News of the South-Southwest — more power . . . more plants . . . more money

Duke Power Dedicates Largest Project

Duke Power Company dedicated its largest hydro-electric project in ceremonies held at the site of Cowan's Ford Plant on September 28.

Governor Luther H. Hodges delivered a brief address and threw a switch which marked the beginning of construction on the \$62 million project.

Cowan's Ford Dam, a mile-long structure, will impound the waters of Lake Norman, named for Norman A. Cocke, retired Duke Power president. Lake Norman will cover 33,000 acres, have a shore line of approximately 400 miles and will be the largest of eleven Duke Power lakes on the Catawba River.

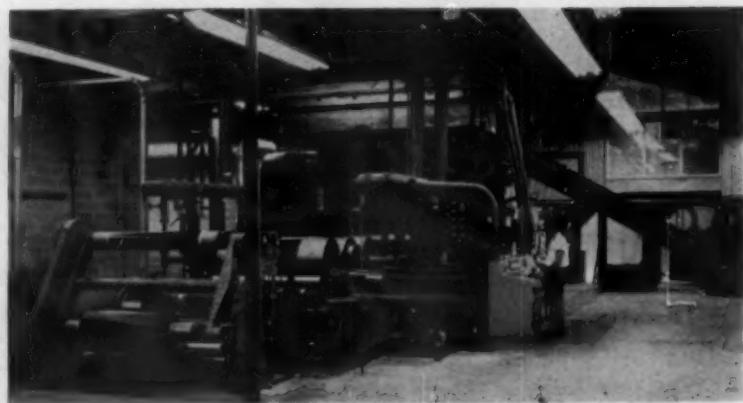
The mile-long concrete and earth-filled dam will be over 100 feet high and will span the Catawba from Mecklenburg to Lincoln county for a distance of 5,649 feet. The power house will be located on the Lincoln county side with an initial generating capacity of 262,500 kilowatts. Ultimately, the plant will have a capacity of 350,000 kilowatts. As an indication of the project's magnitude, the combined generating capacity of the other ten dams on the Catawba is 440,000 kilowatts.

Cowan's Ford will take about three years to build. Power generated at Cowan's Ford is expected to be delivered to Riverbend Steam Plant substation by 230,000 volt transmission lines and fed into the company's balanced system. The site is situated seven miles southwest of Davidson between Lookout Shoals dam and Mt. Island dam.

G-E Turbine for Tulsa Refinery

D-X Sunray Oil Company's expanding refinery at Tulsa, Okla., will utilize a General Electric combustion gas turbine in its new dewaxing process.

The 7500 horsepower, simple-cycle, single-shaft gas turbine will be installed by the Foster Wheeler Corporation, engineers-contractors, in the dewaxing process addition to the refinery, and will directly drive two compressors in tandem; one to be a propane refrigerating compressor, and the other to be a flue gas compressor.



View of Farrel inverted "L" calender from the delivery end. All controls are automatic, and are indicated on the operator's desk, where close check is kept of temperature and thickness of film. Radiographic scanner inspects for pinholes or other breaks in film.

Plicoflex — Houston

A new plant has been placed in operation in Houston by **Plicoflex, Incorporated**. Its main product is a laminated polyvinyl chloride and butyl rubber tape for use as a protective wrapping for pipelines. The company also plans to make vinyl film, laminated film and offers compounding and slitting services. Pipe-

lines wrapped in this tape are protected from corrosion whether buried, submerged in water, or exposed to corrosive atmospheres.

D. E. Hughes, Jr., is President of the company, and other officers are E. T. Bovee, Executive Vice President and General Manager; James G. Nicholson, Secretary-Treasurer; and Martin Rosen, Technical Director.

Babcock & Wilcox Boiler for Texas Utility

The **Babcock & Wilcox Company** has a contract to manufacture and install a boiler at the new Valley Steam Electric Generating Station of the Texas Power & Light Company.

Expected to go on-line in 1962, the boiler will deliver 1,250,000 pounds of steam per hour to a turbine generator at a pressure of 1925 psi and a temperature of 1005 F at the superheater outlet. The boiler, which has a design pressure of 2250 psi, also will reheat 1,105,000 pounds of steam per hour to a temperature of 1005 F at the reheater outlet.

At full load, the unit will burn approximately 1,600,000 cubic feet per hour of natural gas having a total heat content of 1.7 billion Btu's. Provision has been made for the boiler to fire oil as a stand-by fuel.

Located three miles south of the Red River and about two miles north of Savoy, Tex., the new power plant will consist initially of the Babcock & Wilcox manufactured boiler, the

turbine generator and the auxiliaries. A man-made lake of several hundred acres will supply the condensing water.

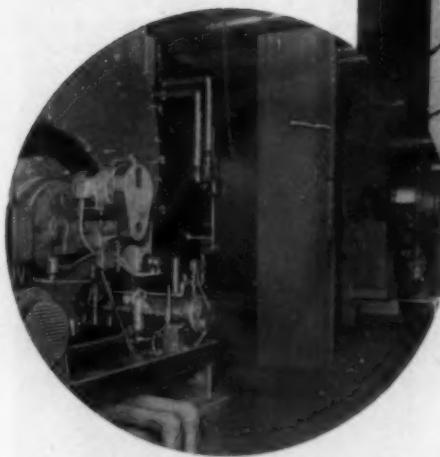
Industrial Expansion — Ga.

Ninety-six new industries representing a capital investment of \$29,715,000 have located on the lines of the **Georgia Power Company** during the first nine months of 1959. Only industries representing investment of \$50,000 or more and employing at least 10 persons are included in the power company's report.

In addition to the new plants, 50 existing industries constructed new facilities to expand their operations. These new facilities represent a \$44,890,000 investment.

The new plants and expansions will provide employment to 6,867 Georgians at annual wages totaling \$20,256,000. New plants and additions established during the first nine months of 1958 provided 6,104 jobs at annual wages of \$18,118,700.

Where the steam comes from



...for Mutual Benefit Life's
fine new buildings in Newark, N. J.

Complete firing system in one package.
Every factor that affects firing efficiency is engineered into the unit at the factory. The unit includes: (1) Single or dual-fuel burner, with complete fuel handling systems. (2) Forced draft air supply. (3) Enclosed control panel, with instruments mounted, factory wired and tested, and with signal lights and gauges that afford a complete reading at a glance. In the oil-gas units, fuels can be switched automatically, or with the simple flick of a switch.

Fire low cost residual oils

The heavy residual fuel oils (No. 5 and 6) have higher heat value than light heating oils, yet cost less per gallon.

The Iron Fireman boiler-burner units shown here fire these sluggish oils with complete dependability. They protect against fuel emergencies because they can fire *any* grade of oil, light or heavy.

Gas or oil—switch fuels instantly

Dual-fuel models fire either gas or oil, and can be switched either by manual or auto-

matic controls. In some areas gas rates are substantially less for customers whose steam plants switch automatically from gas to oil firing when outdoor temperature falls below a certain level, relieving the load on main gas lines when demand is highest.

Fires all types of boilers

Iron Fireman residual oil firing (with or without gas) is available in complete boiler-burner units ready for service connections, or as a package firing system that can be applied to any type of boiler.

Send coupon for further information

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT
FOR OIL - GAS - COAL



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City State

News of the South-Southwest — more power . . . more plants . . . more money



Chemstrand — North Carolina

Construction is underway on Chemstrand's multi-million dollar research center in the Research Triangle Park of North Carolina near Raleigh.

The facility will be owned and

operated by the Chemstrand Research Center, Inc., a newly-formed wholly-owned subsidiary of The Chemstrand Corporation. The building is scheduled for occupancy by fall of next year. Dr. David W. Chaney is Executive Director Research. Contractor on the project is Daniel Construction Co., Greenville, S. C.

New ICC Rates — Tampa

W. C. MacInnes, President of Tampa Electric Company, announced that the Interstate Commerce Commission has granted a Petition for a substantial freight rate decrease for the shipment of coal to the Tampa area. This decrease in rate amounts to 86 cents per ton or a reduction of 18.4 per cent. The new rate will be \$3.80 per ton compared with a \$4.66 rate which previously applied.

This significant reduction in freight rates will bring substantial savings to all customers of Tampa Electric Company through reduced generating costs of the new Gannon Station, which is the first large modern coal burning plant to be built in Florida.

Koppers Precipitator for TC&I — Birmingham

Baltimore shops of the Metal Products Division of Koppers Company, Inc., have completed fabrication for the United States Steel Corporation of an electrostatic precipitator for a new sinter plant at the corporation's Tennessee Coal & Iron Division at Birmingham, Ala.

Design of the unit provides three collection fields within the precipitator, each six feet long and 24 feet high. Overall width of the unit will

be approximately 60 feet. Specifications on efficiency of the precipitator call for removal of 98 per cent of the particulate matter in the gas stream.

Safety Award for W-K-M Div. — Texas

The National Safety Council announced that W-K-M Division of ACF Industries, Incorporated, Missouri City, Texas, has been presented the Award of Merit for its excellent safety record. The plant qualified because of its disabling injury-free period of 1,551,590 man-hours from October 1, 1958 to July 12, 1959. Henry C. Tooley is vice president of manufacturing and acting plant manager at Missouri City.

Magnaflux Becomes General Mills Subsidiary

General Mills, Inc., has announced that the company has acquired the business and assets of Magnaflux Corporation, pioneer in the development of techniques and equipment for detecting hidden flaws in industrial materials.

Magnaflux Corporation, leader in non-destructive testing, will continue in business at its present location in Chicago and under the same name as a wholly-owned subsidiary.

PLANT PERSONNEL

Engineering-Management Appointments Announced by Major Southern Plants

Charles W. Gavitt has been appointed plant industrial engineer of the Parkersburg, W. Va., plant of American Viscose Corporation. Mr. Gavitt has been with the Corporation Industrial Engineering Office since 1957.

Melpar, Inc., Falls Church, Va., has announced the promotion of Kenneth E. Schreiber to manager of the Columbia Pike Production Department.

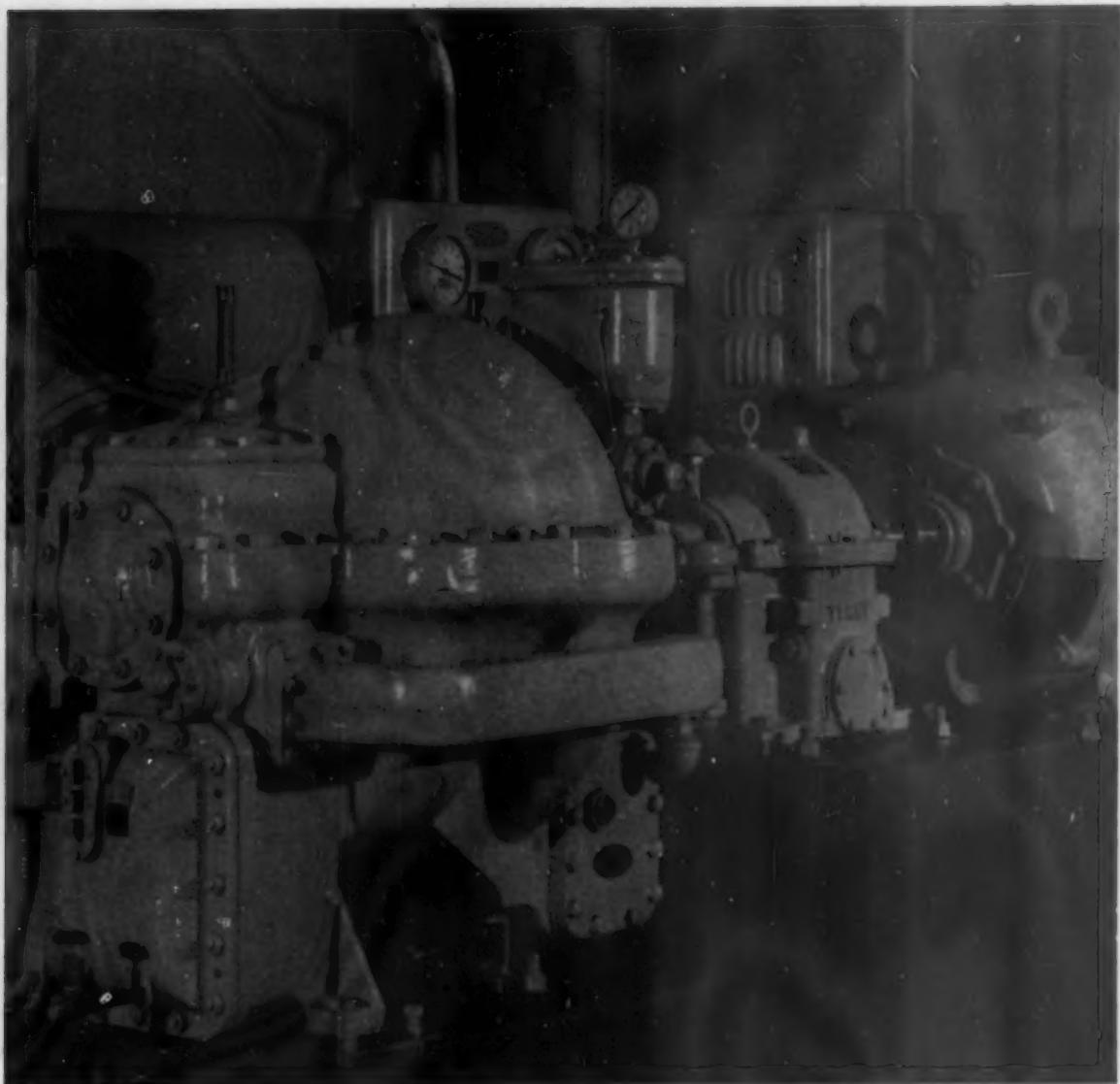
Paul W. Gann, who had served as production control superintendent of the Chemstrand Acrilan acrylic fiber plant since August, 1958, is now staff purchasing agent for the Chemstrand Corporation, Decatur, Ala.

Newly named manager of the Utility Engineering Division and Laboratories at Anderson Electric Corporation, Birmingham, is Samuel J. Spurgeon. Prior to joining Anderson, Mr. Spurgeon was a consulting engineer for several years, and for 21 years he was associated in various executive capacities with Alabama Power Company.

Richard M. Chamberlain is plant manager of Reynolds Metals Company's new plant at Grottoes, Va., where the plastics division's operations were recently moved from Gary, Ind.

Frank Van Kirk is plant manager, and Andrew Sokel is plant resident project engineer, at the Johns-Manville fiberglass plant now under construction at Parkersburg, W. Va.

Manager for the new Dow Corning Corporation technical service and development laboratory to be built at Greensboro, N. C., will be William H. Ragborg. The laboratory will be part of the company's product engineering department, and will also do research and quality control work.



It started over 70 years ago

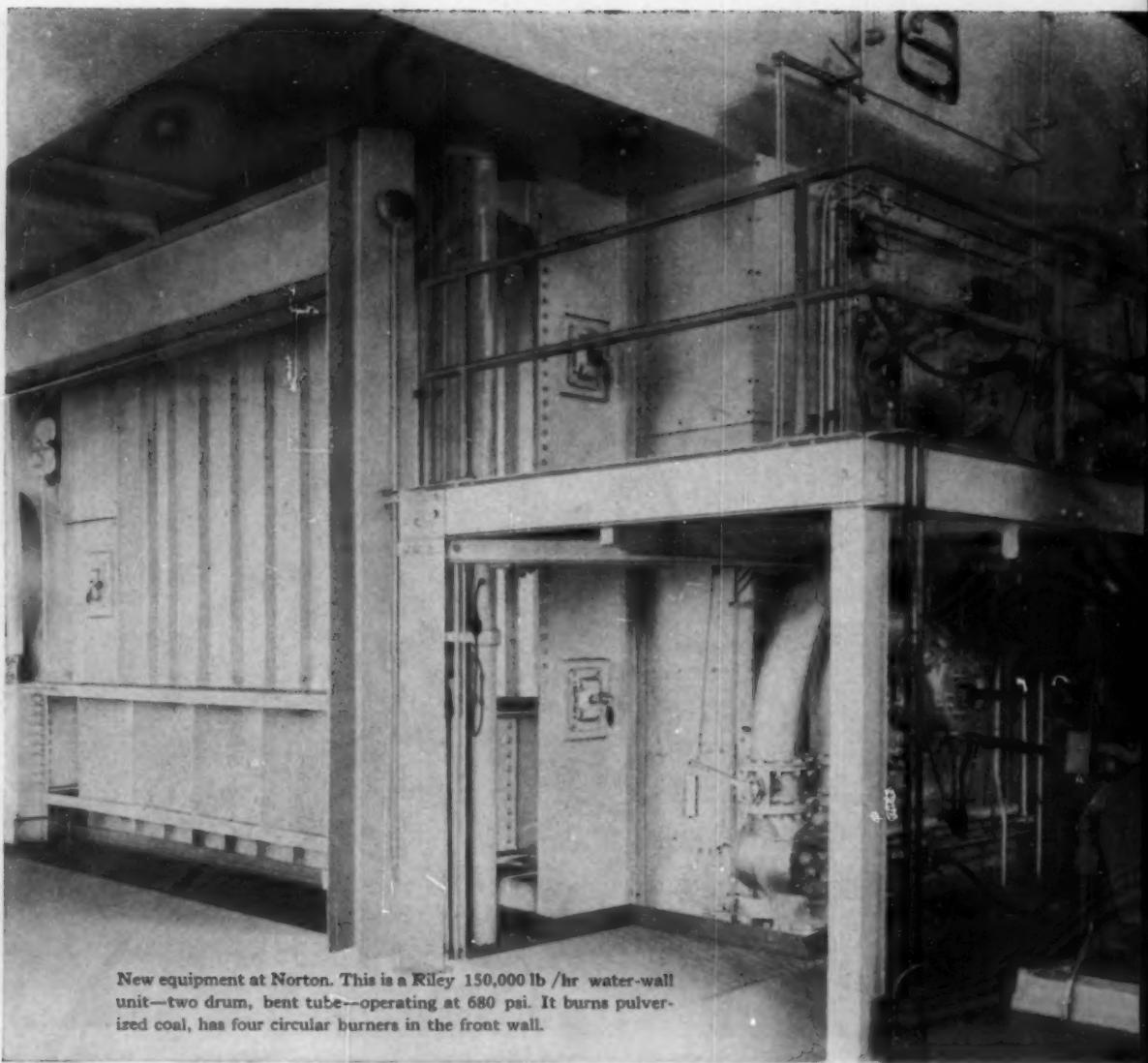
The unit shown only started Monday morning as usual . . . but the Standard Oil lubricants that keep it rolling trouble-free, day-in and day-out, had their start in southern industry *72 years ago*. During these years changes in power producing machinery have been constantly reflected in new and improved Standard Oil lubricants. The success of Standard Oil lubricants in keeping pace with the growing needs of industry is attested by the continuing *first place popularity*.

ularity of Standard Oil lubricants throughout southern industry.

Aside from unmatched results in product development and performance Standard Oil's 72 years of experience offer another very practical benefit . . . available to you at any time and at no charge. Through your Standard Oil lubrication specialist Standard Oil's full experience is at your command whenever lubrication poses a problem in your operation. Why not call him in today?



STANDARD OIL COMPANY
(KENTUCKY)



New equipment at Norton. This is a Riley 150,000 lb /hr water-wall unit—two drum, bent tube—operating at 680 psi. It burns pulverized coal, has four circular burners in the front wall.

Coal proves best dollar

NORTON COMPANY FINDS COAL STILL IS LOWEST COST

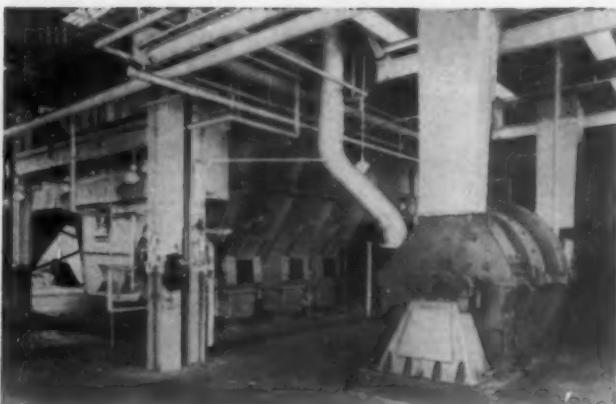
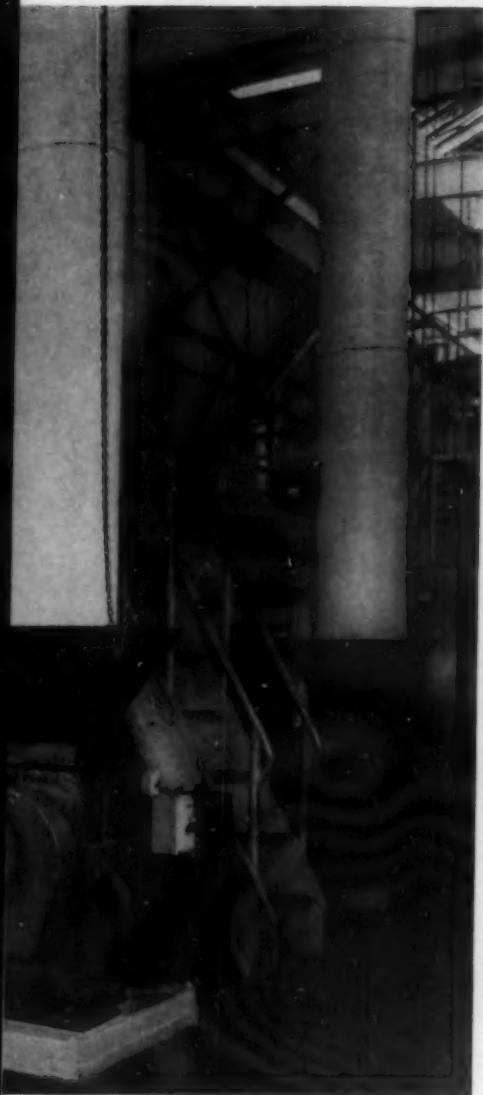
As plant facilities expanded, the Norton Company, Worcester, Mass., world's largest manufacturer of abrasive products, required greater quantities of steam for heating, hot water, electricity and process work. This expansion prompted an engineering survey to determine future power needs. As a result, Norton staff engineers—working with K. R. Warrington, Consulting Engineers—decided to install additional steam generating equipment. Coal had been used previously because it was the most economical of the fuels in that area when the original plant was installed. Coal *continues* as the fuel of the new plant for the same reason. Norton management is sold on the fact that, dollar for dollar, coal is the best fuel buy.

COAL IS LOWEST COST FUEL

Today, when the annual cost of fuel often equals the original cost of the boilers, you should know that bituminous coal is the lowest cost fuel in most industrial areas. And modern coal-burning equipment gives you 15% to 50% more steam per dollar, while automatic operation trims labor costs and eliminates smoke problems. What's more, tremendous coal reserves and mechanized mining procedures assure you a constantly plentiful supply of coal at stable prices.

CONSULT AN ENGINEERING FIRM

If you are remodeling or building new heating or power facilities, it will pay you to consult a qualified engineering firm. Such concerns—familiar with the latest in fuel



In the center, ash hoppers—part of United Conveyor steam vacuum ash handling system—lead to underground conveyor which moves ashes to outside storage silo. At right: coal pulverizers.



From track hopper, 100 ton/hr boom conveyor (right) carries coal to storage area. Bucket conveyor (center) lifts it to belt conveyor at top of plant. Coal handling system by William T. Donovan C. and Jeffrey Manufacturing Co.

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costs and equipment—can effect great savings for you with the efficiency and economy of coal.

TECHNICAL ADVISORY SERVICE

To help you with fuel problems, the Bituminous Coal Institute offers a free technical advisory service. We welcome the opportunity to work with you, your consulting engineers and architects. If you are concerned with steam costs, write to address below or send coupon. Ask also for case histories booklet, complete with data sheets. You'll find them informative.

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Guide Specifications, with complete equipment criteria
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 GS-2 (high-pressure heating and/or process plant, ram-type underfeed stoker).
 GS-3 (automatic package boiler for heating and process plants).
 Case histories on larger plants.

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Company _____

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News of the South-Southwest — more power . . . more plants . . . more money



Johns-Manville Expands W. Va. Plant

Johns-Manville has allocated funds for expansion of production facilities at Parkersburg, West Virginia, increasing capacity for manufacturing fiberglass yarns and roving.

F. H. May, Jr., vice president and general manager of Johns-Manville Fiber Glass Inc., said the expansion should be completed by early 1960. In addition, he said, studies are being accelerated on the need for a new Southern textile fiberglass facility.

Expansion of fiberglass manufacturing capacity by Johns-Man-

ville has been proceeding almost continuously since December 31, 1958, when the company acquired the former L.O.F. Glass Fibers Company of Toledo with six plants and a Technical Center. With completion of the current expansion program, Johns-Manville will have increased total fiberglass productive capacity by 50 per cent since the date of acquisition.

The Parkersburg plant manager is Frank Van Kirk. Andrew Sokal, plant resident project engineer, and Robert Bradley, project engineer assigned from Fiber Glass Division headquarters in Toledo, are working on the Parkersburg plant expansion project.

nace, which was formerly used for ferroalloy production, is being converted for calcium carbide. The remodeling work is expected to be completed by mid-1960.

The furnace will be operated by Union Carbide Metals Company on behalf of Union Carbide Olefins Company. The calcium carbide will be shipped to Woodstock, Tenn., where it will be used to generate acetylene for use as a chemical raw material in the operations of E. I. du Pont de Nemours & Company.

FUTURE EVENTS of Engineering Interest

Nov. 30-Dec. 4: 27th Exposition of Chemical Industries, New York Coliseum. E. K. Stevens, Mgr., International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

Jan. 25-28, 1960: Plant Maintenance & Engineering Show, Convention Hall, Philadelphia, Pa. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 25-29, 1960: Seminar on Standardization. American Standards Association, Engineering Societies Bldg., New York, N. Y. Dr. John Gaillard, 135 Old Palisade Road, Fort Lee, N. J.

Feb. 1-4, 1960: 2nd Southwest Heating & Air-Conditioning Exposition, Dallas, Texas. E. K. Stevens, Pres., International Exposition Co., 480 Lexington Ave., New York 17, N. Y., Mgr.

Feb. 1-5, 1960: 4th National Industrial Electric Heating Conference, Cincinnati, Ohio. The Industrial Electrification Council, 750 Third Ave., New York 17, N. Y.

March 6-9, 1960: ASME Gas Turbine Power & Hydraulic Conference, Rice Hotel, Houston, Texas. American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

March 29-31, 1960: 22nd Annual American Power Conference, Hotel Sherman, Chicago, Ill. R. A. Budenholzer, Conference Director, Mechanical Engineering Dept., Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill.

April 20-22, 1960: Symposium on Instrumentation for the Process Industries. Chemical Engineering Dept., Agricultural & Mechanical College of Texas, College Station, Texas.

April 27-29, 1960: Sixth Annual Instrument Society of America Conference and Exhibit, and First Pulp and Paper Division Symposium, Pensacola, Florida. G. W. Howlett, P. O. Box 4426, Pensacola, Florida.

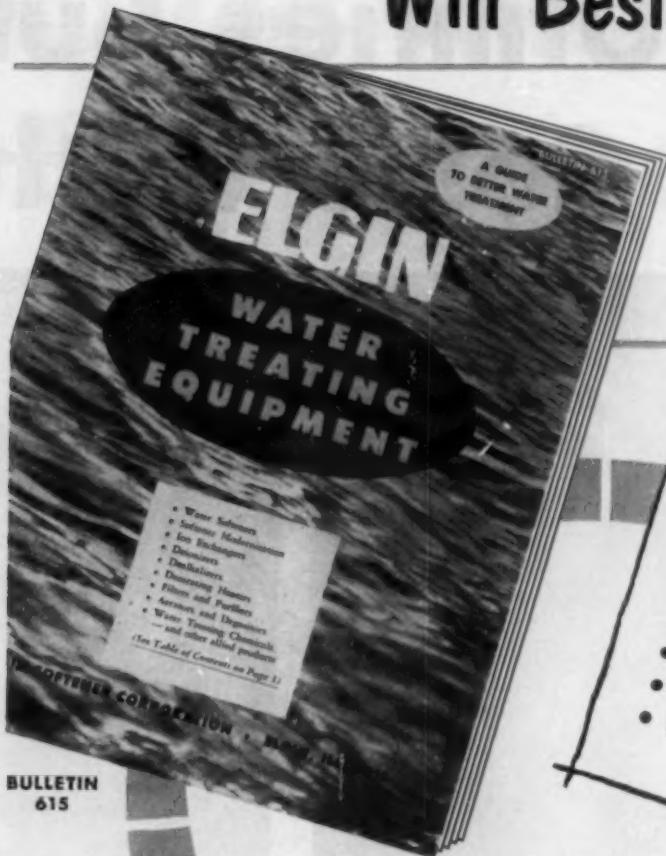
May 9-13, 1960: Southwestern Metal Exposition, Automobile Bldg., State Fair Park, Dallas, Texas. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

(Continued on Page 88)

Union Carbide — Ala. Plant

Plans for the production of calcium carbide at Union Carbide Metals Company's Sheffield, Ala., plant have been announced. An existing submerged-arc electric smelting fur-

Which Water Treating Equipment Will Best Fit the Job?



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you decide

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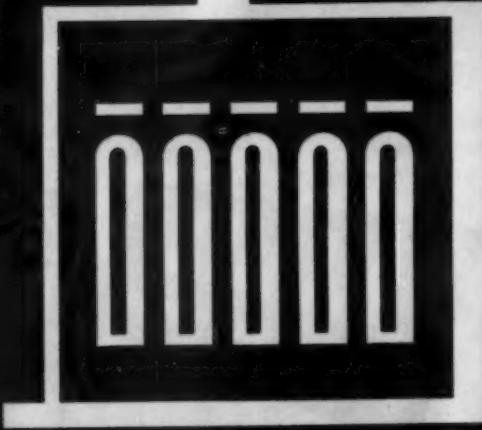
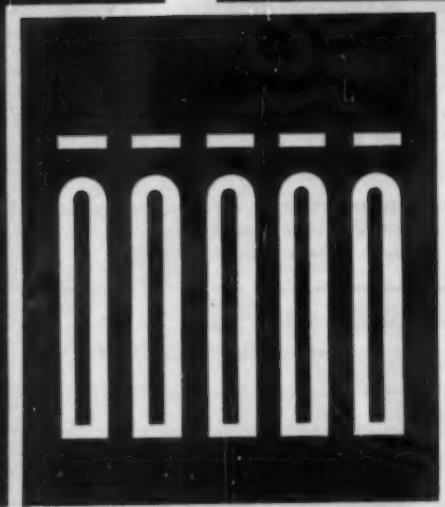
City and State _____

By _____

Mail to Elgin Softener Corporation, 132 N. Grove Ave., Elgin, Ill.

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Over-All Plant Gas Tempering

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...Less Structural Steel
...Lighter Foundations
...Shorter Steam Leads**

Historically, the size of steam generating equipment has been based on two main considerations: space needed to burn fuel, and surface required to cool gases before they reach the convection surface. Boiler designers have long known that to cool the gases, they had to use furnaces much larger than required if complete combustion of the fuel were the only consideration. Now with the proved-in-operation principle of Gas Tempering, the surface requirements to cool furnace exit gases are substantially less.

What is Gas Tempering? . . . it is the reintroduction of cool flue gases near the furnace outlet to control

the temperature of the furnace gases entering the convection surface.

From The Foundation Up, Electric Utilities are finding B&W Gas Tempering the most effective method of controlling temperatures of gases leaving the furnace . . . with a unit that is designed for minimum weight, height and bulk.

Definitive Booklet: If you'd like to learn more about the economies and design flexibility available to you through Gas Tempering, write for Bulletin G-96. Address: The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

Major Advantages of B&W Gas Tempering

. . . It cuts overall plant costs because the smaller size unit requires a smaller building per kw, a lighter foundation, less structural steel and shorter steam leads.

. . . It enables you to utilize the most economical available fuels. It permits the burning of a variety of coals without slagging, minimizes external corrosion of superheater tubes, and assures safe metal temperature, thus prolonging

tube life, regardless of the fuel fired.

. . . It provides safe superheater tube temperature by positive gas temperature control; it protects superheater during startup and under all operating conditions.

. . . It makes it safer to design for economies offered by operation at steam temperatures of 1050 F and above.



B&W

G-933

THE BABCOCK & WILCOX COMPANY
BOILER DIVISION



INDUSTRY SPEAKS

Development of New Marketing Concepts Urged

ELECTRICAL manufacturers must develop "new marketing concepts" to further the economic growth of the nation, JAMES H. JEWELL, vice president in charge of marketing for the Westinghouse Electric Corporation, said recently.

Speaking before members of the American Marketing Association at the Leamington Hotel in Minneapolis, Mr. Jewell predicted that these new selling techniques will pay a vital role in attaining "future security and prosperity" for the United States.

One example he cited was the sale of *systems* instead of pieces. He pointed out that generators, transformers, switchgear and other electrical apparatus have been sold as individual components in the past.

Will Help Design

"We have left it to the utilities to buy these components and to put them together like erector sets," Mr. Jewell said. "This method is no longer adequate. In the future we are going to furnish more than components. We are going to help them design and build power systems."

"We have already made dramatic progress toward this objective. Our engineers have devised a method of building a mathematical model of any power system and setting it up on a computer. Once

this has been done, 20 years of operating experience can be gained in 20 minutes.

"The mathematical model can take into account variables that utility management cannot now cope with, and come up with answers that actually take the risk out of these critical investment decisions.

The *marketing of systems* will begin to dominate the electrical and other industries in the next ten years. In other words, we are going to be marketing engineering skill and scientific resources along with our traditional hardware."

Explaining that the trend has already begun in the industrial market, Mr. Jewell described a control unit which automatically operates a giant cold rolling mill for a steel corporation. He added that a single supplier furnished all of the components for the control unit which actually cost 25 per cent more than the mill itself.

He traced the development of the *systems* concept in marketing to defense products. He also credited military research and development with being largely responsible for the electronic industry as it is known today.

"Military systems whether they be for detection or communications or control are inevitably electronic. More and more the trend is to

think of the electrical and electronic industries as one and the same. And we find them merging in every phase of our industry."

In discussing consumer products which, he said, account for 38 per cent of the total electrical products market, Mr. Jewell described product planning as one of the most important ways for a manufacturer to secure a strong competitive position.

Westinghouse has assigned a marketing team to coordinate research and new product development work with the needs of customers and their changing values. Under this team's supervision, he explained, another group of marketing and research people makes an annual visit to every division of the company. Last year this team returned from its tour with ideas for 640 new products. Thirty of them were picked for the 1959 development program.

The Westinghouse vice president also described improvements that are being made to cut costs and improve service in the physical distribution system of Westinghouse. Mr. Jewell concluded that "data processing equipment and modern communications will revolutionize our physical distribution systems for stock items and this will become a major area for cutting the cost of delivered goods."

How American Brake Shoe Maximates Production

When the American Brake Shoe Company began an extensive modernization program at its New Castle, Delaware plant, one of the first steps management took to maximize production—that is achieve maximum output at less cost—was to install a Hoffman pneumatic conveying system for keeping bentonite, dextrin, silica flour and other materials *on the flow*. With a Hoffman exhauster furnishing the air as well as suction for the handling system, and use of components described here, the equipment not only simplified bulk conveying chores but paid its way in a few months by providing substantial production, material and labor savings.

MATERIAL INTAKE VALVE

Materials are introduced into the air stream through a unique non-clogging intake valve attached to the bottom of a hopper and flow smoothly through pipe lines to any one of six primary cyclone storage tanks more than 350' distant. Hoffman intake valves insure the uninterrupted flow of dry, powdery or granular materials through all types of vacuum conveying systems. Suitable for use with 2" through 6" pipelines, they are equipped with standard 8" flanges and can be easily attached to bins, hoppers, or dust collectors. Connected equipment is protected from exposure to the full suction of the system by a separate air inlet. The material handling rate can be adjusted while air is flowing. Thorough mixing insures smooth transit.

HINGE VALVE

Self-cleaning Hoffman hinge-type discharge valves are designed for air-tight closure against a head of material. The one-piece valve body is cast of gray iron with its rubber-faced disc and seat completely inside



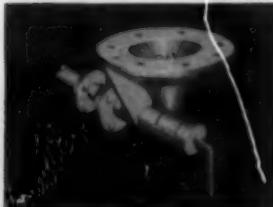
A portion of the Hoffco-Veyor system installed at the American Brake Shoe Co. plant in New Castle, Delaware.

the casing. Lever linkage permits operation by means of chain or cable from a remote station. Provision can also be made for air or hydraulic cylinder actuation of the valve.

ROTARY VALVE

Chain driven rotary discharge valves of cast semi-steel construction feed the material in controlled quantities. Designed for interchangeability of various types of fabricated and cast rotors, valves are equipped with torque limiting drive sprockets for protection against jamming and overloading. Equalizing connections permit attachment of bleed lines to vacuum or pressure source. Inspection of the interior can be made through an access port without disassembly of the valve.

Material intake valve



Hinge valve



Rotary discharge valve



Peristaltic rubber valve



PERISTALTIC VALVE

Controlled expansion and contraction of rubber diaphragms permit discharge in measured quantities. Since there are no internal moving parts, even coarse abrasives can be handled with minimum wear. Sheet rubber diaphragms are easily replaced whenever necessary.

COMPETITIVE ADVANTAGES

In handling quantities of dry, free-flowing powdery and granular materials such as sand, shot, chemicals, etc., Hoffco-veyor systems and components speed production—provide many genuine benefits and advantages which are reflected in higher profit margins. These include:

- flexibility
- cleanliness
- time saving
- lower initial cost
- easy installation
- material saving
- labor saving
- pay for themselves

FREE ENGINEERING SERVICE

If you have a materials handling problem, you can solve it with either a complete Hoffman system or any of its parts which may be purchased separately to fit your needs. Available equipment includes dependable centrifugal blowers/exhausters, cyclones, collectors, material intake, hinge, rotary, butterfly and peristaltic valves as well as filter bag collectors. We'll be glad to make a free engineering survey to determine how you can improve your manufacturing methods by maximizing production with a really tight method of material handling. Send now for a free descriptive booklet. Please write:

Air Appliance Division
Dept. EM
U. S. Hoffman Machinery Corp.
103 Fourth Avenue
New York 3, New York

TIMELY COMMENTS



Can Industrial Leaders Meet Political Challenge?

THERE IS considerable agitation here and yonder — particularly in business associations and societies — to have men in industry take a more vigorous part in political activity. Certainly it is desirable for them to do so — the same as it is desirable for all intelligent citizens to express their opinions and exert political influence.

But such action on the part of industrial leaders is more important than similar activity on the part of average people — because the men in industry are more important individuals. Their position alone makes them leaders. They are the most important men in their respective areas — not only because of their direct influence on a large number of employees, but because of their indirect influence on the community as a whole.

Consequently, here as in all of their actions, industrial heads carry heavy responsibility. They must be right in their decisions.

So this leads to another load for the already heavily burdened industrial executive. Already, he must be a student of personnel, public relations, production, engineering and marketing. Now it is demanded that he be a leader in politics. Ok! But he must "bone-up."

Politics is a science with many facets. It's all right (even necessary) that industrial leaders be active in politics. But it is essential that they be active in the right way. And that requires study.

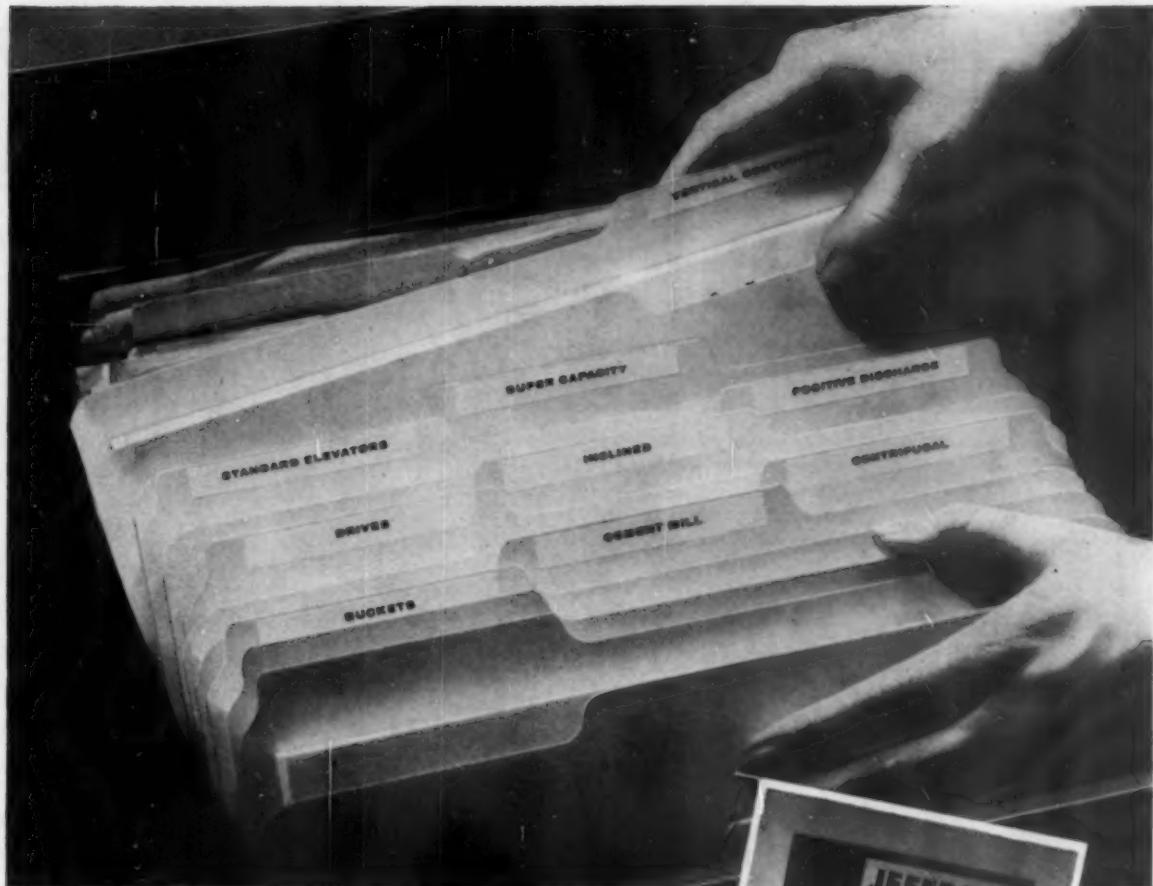
Will these men of action study politics

and government enough to be wise in choosing their course of political activity? Merely protesting when they are stepped-on or promoting when they see a chance of gain is not enough. Their real gain will come from a broad-visioned attitude. In fact it will be necessary to put reverse English on the unpopular comment of a former leader — and say in all sincerity, "What is good for the entire country is good for business."

Above all, industrial leaders will need to know the politicians — their ability, their motives, and their performance records. If it becomes necessary to keep a "little black book" there should be two columns for each individual politician's record — a good column as well as a bad column. Few will seem perfect. It will always be necessary to choose the best at once rather than wait for perfection. But careful action and wise voting can eventually approach much closer to perfection in our politicians than at present.

Some kind of record on past performance of political leaders is essential — Lest we forget. We are too inclined to forgive, and let by-gones be by-gones in choosing men for political office. Men (including politicians) do not normally improve very much morally. If they got on the wrong side of law and order once, they are likely to do so again. Give every man another chance, Yes! But not in politics.

There are enough good, honest, competent men available to staff our political offices effectively if we choose them wisely and treat them fairly.



Have complete Jeffrey bucket elevator facts at your fingertips

Jeffrey offers a complete range of bucket elevator systems and components for elevating bulk materials from fines up to 8 inch lumps. You can have complete facts at your fingertips by sending now for this new 96-page catalog complete with types, weights, dimensions and capacities.

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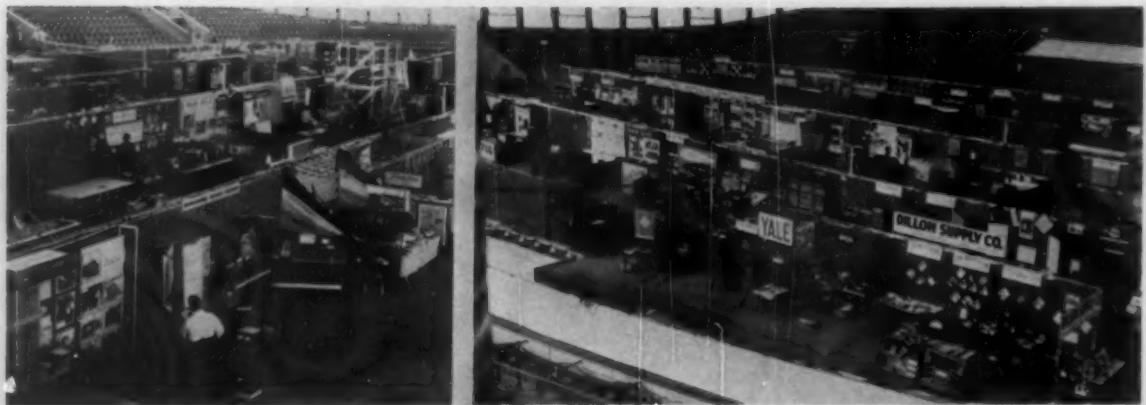
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CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING



The following article is abstracted from a paper presented at the Southeastern Plant Engineering Maintenance Seminar at Raleigh, N. C., on Sept. 23. The above photographs show views of the equipment show held in conjunction with the seminar.

PLANNED MAINTENANCE Pays Off for Chatham at Elkin, N. C.

By **RAYMOND E. HENDERSON**, Vice President
Chatham Manufacturing Co., Elkin, N. C.

A PERIOD of unsatisfactory business always brings about a close examination of all areas of expense. Of necessity, every business begins to look critically at all its functions in order to find improvement possibilities to at least mitigate the severity of declining business.

All of you who are familiar with the textile industry know that beginning in 1954, business was not at all satisfactory and a number of plants have been either merged or liquidated since that time. This situation continued until near the end of 1958.

After a good deal of discussion in our own business, and with the knowledge we had of our operations, we decided that the area of plant engineering and maintenance offered good potential for cost reduction and general improvement. With this in mind, we set out on a program in one of our medium-sized departments to in-

stall what we termed a Preventive Maintenance Program. All of the possibilities for improvement which we could anticipate were listed as follows:

1. Increased Production
2. Reduced Direct Labor Cost
3. Reduced Supply and Repair Cost
4. Reduction of Defective Goods
5. Reduction of Waste
6. Reduction of Power Cost
7. Reduced Maintenance Labor Cost

Our approach was made slowly and cautiously, because we were exploring new territory as far as mill organization was concerned. This program was started in early 1955, and the first move was to organize an overhauling crew of four men. We set out to take the 90-odd machines in this department, one at a time, and bring

them up to the highest level of good mechanical condition.

This crew was selected carefully as to their competence in the maintenance field and was set up under the control of the plant Engineering Department.

Heretofore, the upkeep of machinery and equipment was the responsibility of individual production department heads. These men, being responsible for the multitude of duties in running a department, could give little time and thought to proper machinery upkeep. Furthermore, few production supervisors are trained engineers in the mechanical field, and therefore are not equipped with training and experience to do the refined job in the upkeep of machinery which present-day competitive conditions demand. For that reason, we assigned this critical part of our operations to the Engineering Department.

As time passed, we kept careful

DETAILS OF IMPROVEMENT
PREVENTIVE MAINTENANCE PROGRAM

1. INCREASED PRODUCTION 12%
2. REDUCED DIRECT LABOR COST 8%
3. REDUCED SUPPLY & REPAIR COST 10%
4. REDUCTION OF DEFECTIVE GOODS 6%
5. REDUCTION OF WASTE 8%
6. REDUCTION OF POWER COST 8%
7. REDUCED MAINTENANCE LABOR COST 10%

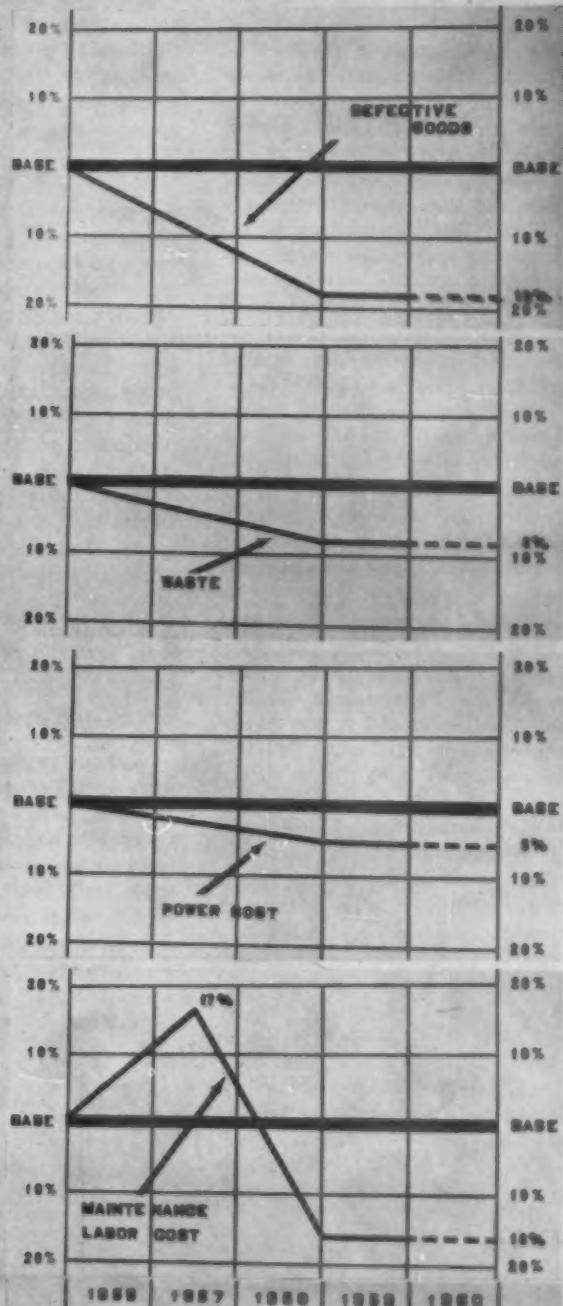
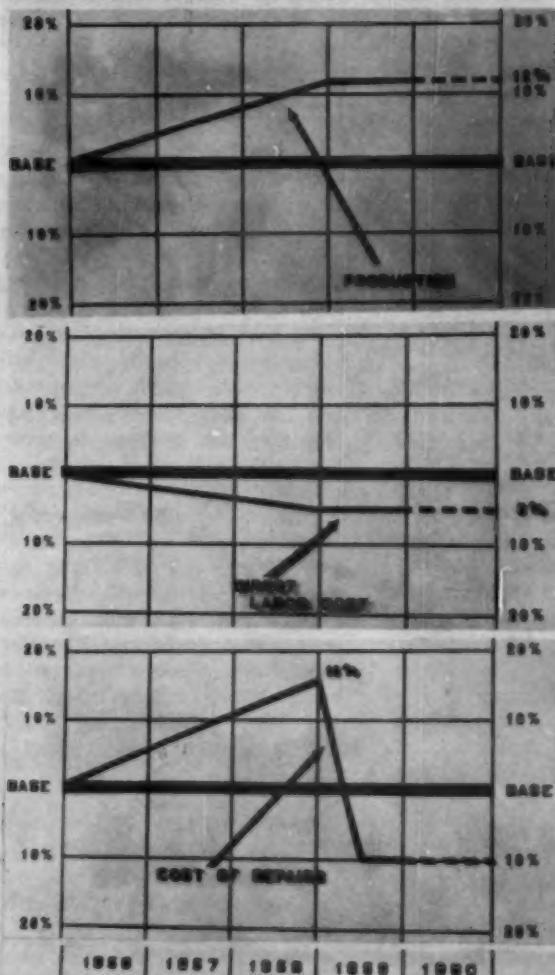


CHART 1—Summary of Results

CHART 2—Increased Production

CHART 3—Reduced Direct Labor Cost

CHART 4—Lower Repair Cost

CHART 5—Less Defective Goods

CHART 6—Reduced Waste

CHART 7—Lower Power Cost

CHART 8—Less Maintenance Labor

records of every area of expense and improvement. A summary of results is presented in chart No. 1 on the preceding page. I believe you will agree that our work was quite worth-while.

As we gained confidence in the soundness of this program, we began to install it in other departments. To date we have 11 of our 18 different departments operating under this Preventive Maintenance Program, and each in turn has proved its worth beyond our expectations.

Charts 2-8 show the details of the improved program of the department where we first started this work. The results of this department, as shown by these charts, is typical of the good results which we have realized in subsequent departments where the program has been installed.

As with any new program which is basically sound, you constantly find new possibilities for refinement and improvement that were not at first anticipated. We have a number of critical machine parts which the Maintenance Department has developed to the end of improvement, and which resulted in satisfactory reduction in supply and labor costs.

The overhauling of machinery on a methodical and scheduled basis is nothing new in the textile business. It has been done with varying degrees of satisfaction over a period of many years. While overhauling is an important part of this whole concept of Preventive Maintenance, it is only one part. In addition, we have instituted frequent checks and repairs to critical parts of the various machines between overhaulings.

We have also set up areas of control to insure uniform production equipment speeds on various products. At the same time, we have organized a program of inspection and overhauling of motors and switches on the various machines.

In refining this operation, the following are some of the important approaches we have developed:

1. PERSONNEL

We made a very careful selection of personnel who were as-

signed to this work, both the men who supervised the work as well as the rank and file who actually did the work on the machines. Our experience has led us to know that such selection and careful training is the most important single item in building a maintenance program.

2. SPECIALIZATION

Regardless of the qualifications of maintenance personnel, no man can be an expert in all jobs to be performed. Dissecting of large or complex repetitive jobs into basic elements will lead to specialization. Therefore, such assignment of personnel will develop a high degree of expertness not otherwise obtainable on the part of individual men.

For example, crews are assigned to similar types of equipment, regardless of departmental boundaries. In other words, equipment of the same general type, even if located in different departments, was assigned to one group of specialists.

3. STANDARDIZATION

Without proper standardization of machine parts, work simplification becomes a well-nigh unsurmountable handicap. If corresponding parts on similar machines were not interchangeable, then each replacement would become a specialized job, making it most difficult to establish satisfactory simplification.

Without standardization, even the stock of standard parts becomes extremely complicated. This is an important factor in some industries that have large numbers of similar machines.

4. COMPONENT PARTS

This is a procedure which has been used to advantage in the electronics industry. There are many places where it can simplify machinery maintenance also. This principle is to replace faulty assemblies as units, rather than repair them in the field. The assembly is sent to a repair area to be reconditioned, where facilities and time will permit a thorough job. In this case, complete and extra assemblies must be provided.

5. LUBRICATION

As our work progressed, it was apparent that lubrication was at fault in many instances, so a lubrication engineer was added to the staff. In addition to specifying lubricants, he actually supervised the men in order that lubrication cycles could be established and adhered to.

In addition to keeping machinery lubricated on schedule, these men were given the task of checking and turning in daily check sheets listing all points which gave evidence of wear or which needed attention from the maintenance men.

6. SEMI - SKILLED AND UN-SKILLED LABOR

By breaking down complicated jobs into component parts, many of these smaller simplified jobs can be done by less skilled labor, leaving the skilled men to concentrate on those jobs requiring their skills.

We have placed quite a number of physically handicapped employees with long service on these jobs. In many cases, these jobs require little physical exertion. Furthermore, many of these handicapped employees are irregular in attendance, but the work will not suffer when some of them are away from the job. Without such usage of handicapped employees (of which every plant has its problem), these men become a problem in regular production departments, because they cannot carry their fair share of the load.

7. DESIGNING AND ENGINEERING

Various parts of machines lend themselves to many improvements when studied by a qualified tool designer or engineer. Much of the "human element" can be eliminated by the use of special tools, gauges, or by redesigning of machine parts. Such inadequacies can be corrected on the job by redesigning. There will be some parts which necessitate frequent maintenance that can be corrected in many cases by redesign or modification.

There are many examples, as we have proved to our own satis-

faction, of machines which will lend themselves to redesign or modification to considerable advantage.

8. RECORDS

An important aid to simplification is the use of proper and sufficient records to determine where effort for simplification is warranted. Without such records it becomes largely a matter of judgment as to where extended effort and money are worth-while. With these records the effect of corrected action or redesign of parts can be accurately appraised. Furthermore, an adequate supply of

necessary parts can be maintained with a minimum tied up in the inventory of such parts.

Results and Plans

Our nearly five years of experience in this concept of Preventive Maintenance has convinced us that it is most worth-while. It has brought our operations to a level of excellence, and therefore economy of operation which we could never achieve before. We are working to the end of setting up all machinery and auxiliary equipment under this program, and anticipate another two years before it is fully effected.

ment for cathodic protection of a taped line was also estimated to be less.

Florida is the nation's last major untapped natural gas market, and gas in the 2,654-mile pipeline system from the Rio Grande Valley to Miami, will flow at the rate of 282,000,000 cubic feet a day.

The Baton-Rouge-Miami line is being constructed by Midwestern-Walco Contractors, a joint venture of Midwestern Constructors Inc.; and Walco Engineering and Construction Company of St. Petersburg, Florida.

Herbert Construction Corporation of Birmingham has the contract for installing laterals from the main line to sales areas in Florida, part of which has been subbed to Mid-States Construction Corporation.

Tape Covers Florida Pipeline

By HARRY J. MILLER

POLYETHYLENE tape is being used as the wrapping on a major natural gas line. Along the Baton-Rouge-Miami section of the \$167,000,000 pipeline being ditched-in across Florida from McAllen, Texas, the tape is being installed at the rate of 22 miles of the protective wrapping for each 2 miles of pipe-laying progress.

According to officials of the Houston Texas Gas and Oil Corporation, the pipe contractors, whose crews have been laying from 1 to more than 3 miles of line a day, indicate they are saving an average of \$500 per mile of installed tape by switching to polyethylene tape. The tape used is polyken, a product of Bauer & Black Division of the Kendall Company.

The higher cost of tape materials (about one-third more than coal tar, which is specified for most pipelines) is more than offset by savings in application. The estimates are based on the following figures (coal tar at \$72 per ton, using 17 tons to the mile, 370 squares of felt, 370 squares of glass and 83 gallons of primer):

Houston also estimated savings

of 25 cents per foot, or \$1,320 per mile, in tape applications due to reduced labor and machinery required. Subtract from this figure the \$778 difference in cost of materials and you have \$542 which the company reported it was able to save per mile of installation by using tape.

This is computed as a weighted average for all sections of line and all conditions. Current require-

Materials Cost Coal Tar Coating

Coal tar	\$1,244
Felt	629
Glass	407
Primer	91
Total	\$2,371

Materials Cost Polyethylene Tape Coating

Tape	\$2,520
Felt	629
Total	\$3,149



The contractor estimates a saving of \$500 a mile by using tape wrapping.

Job Evaluation that Sells Itself



By **JAMES F. HAYNES**

Treasurer, Guy Arthur and Associates, Inc.
Toccoa, Georgia

This is a case history of a Job Evaluation Program installed in an Alabama plant. As you read it, note how the acceptance of the program by employees was accomplished step by step.

AT AN AUGUST meeting of the Plant Operations Committee, the Chairman reported that the Board had agreed to have a firm of consultants carry out a *job evaluation study* of all jobs in the plant. They asked for the cooperation of all department heads in the planning and conduct of the program.

Principals of the consulting firm met with the Plant Operations Committee some two weeks later. At this meeting the *job evaluation program* was outlined in detail and a Job Evaluation Committee was appointed.

The method selected for job evaluation is known as the factor ranking method. This method permits the evaluation of unlike jobs on the same scale with relative ease and accuracy. It is based on the idea that all jobs have certain requirements insofar as skill, responsibility, effort, etc., are concerned; and that by comparing one job to another, it can be determined which job has the greater requirements of any factor.

Steps involved in a Job Evaluation Program by Factor Ranking are:

1. Agree on the Factors, together with a definition of each.
2. Agree on the Job Check Sheets to be used.
3. Get Job Check Sheets filled out for each job.

4. Rank all jobs on one factor at a time.
5. Assign relative weights for each factor.
6. Determine total point values for each job by multiplying rankings times weights.
7. Plot results to determine natural classifications.

The Factors agreed upon were:

1. Working Conditions.
2. Effort.
3. Know-How.
4. Physical Skill.
5. Responsibility.

In an initial meeting with the Plant Job Evaluation Committee, typical Job Check Sheets were reviewed. These job sheets covered the factors previously mentioned and were modified to fit plant operations.

The company's personnel department then began the task of getting a set of check sheets filled out for each job. Actual operations were observed, and employees interviewed singly and in groups to get the factual data for the check sheets. A letter was directed to all employees to explain the program and to solicit the cooperation of all employees in moving ahead with the evaluation.

When check sheets had been filled out for all jobs, multiple

copies were made for the use of the Ranking Committees.

Method in Action

A ranking board was provided for the use of the committees. This was built of plywood and mounted on a stand in the Conference Room. It was marked off in blocks, numbered from 1 to 20 as shown below:

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

A Ranking Committee for Effort was selected by the Job Evaluation Committee. Ranking committees were selected to represent a good cross-section of departments, occupations and shifts. They included hourly operators and supervisors. This committee met on the first Monday in October to rank all jobs on the factor of effort.

The Factor Ranking Method of Job Evaluation was reviewed in detail with each new group prior to any attempt at ranking. Each job name was written on a 3 x 5 inch card for easy positioning on the Ranking Board with thumb tacks or scotch tape for easy changing. The job name was put

on the card in large letters with a felt pen so committee members could read it at a distance of fifteen to twenty feet.

In ranking, all jobs in a related group are compared with each other on one factor at a time (in this first meeting, for example, on effort). Working from the check sheets, and utilizing the varied knowledge of all members of the committee, the job card having the least requirement insofar as effort is concerned was placed in *Position No. 1* on the ranking board. The job card representing the greatest requirement of effort (as defined in the check sheets) was placed in Block No. 20 on the ranking board. All other jobs were placed in relative positions between 1 and 20.

It was agreed that certain jobs had equal requirements of Effort and these were placed on the same position. Job name cards were moved from one position to another until the group, by free discussion, was able to agree that they were placed in their proper relationship. After all the jobs had been ranked on this factor, the position number was recorded on the back of the 3×5 card and another record separately made of all card positions on the board.

The makeup of the Ranking Committee was changed for each factor to give employees and supervisors from each shift and each department a chance to sit in on the evaluation. An informational letter was written to all employees upon the completion of the ranking of all jobs on all five factors, explaining what had been done to date by the different committees.

A sixth committee was assigned to agree on the maximum number of points which can be given to the top ranking job in each factor. The decision of the committee was that the factor of Effort could carry a maximum of 150 points, while the maximum for Working Conditions was somewhat lower, and the maximum for Responsibility somewhat higher, etc. A letter telling about the assignment of weights for each factor was sent out to all employees.

With the information now available, it was possible to compute the total point values of each job. After these computations had been completed, total points for each job



were plotted on a graph and natural classifications were determined. All jobs were broken down into nine job classes.

An *Area Wage Survey* was conducted to determine competitive rates for key jobs. All the companies asked to participate in the study were very cooperative. With this information, rate ranges were established for each job class.

Changes

When there is reason for review of a job because of changes in job content or methods or other cause, the following procedure is to be followed:

1. Get a new Check-Sheet filled out for the job.
2. Check against the old Check-Sheet to see if there is any justification for changing the ranking of any factor.
3. Have the Job Evaluation Committee re-rank the job in light of such changes.
4. If changes are made, recompute points to determine classification of job.

The person or persons whose job is involved would meet with the Job Evaluation Committee for such a review.

In the company's first letter to employees about Job Evaluation, they were given the following information:

"It is important that you know that job evaluation is a study of

jobs and not of the people doing those jobs. For each job in the plant the Committee is trying to determine the amount of effort, responsibility, "know-how," and physical skill required by the job, as well as the working conditions. When all of the check sheets have been completed, we will rank them in order and at this stage will call on certain supervisors and employees from different departments to assist. We hope that this job evaluation work will be completed in early November.

"There are two things which we feel are most important for you to know:

1. It is certain that a few people will receive increases in pay because of this study, but it is equally certain that many people will not receive increases in pay.
2. No one will receive a cut in pay because of job evaluation.

"This study of jobs in a planned and scientific manner is another part of the company's policy in attempting to make this plant the best place to work in the entire area."

During the whole evaluation program, it was evident that employees were gaining a great deal of knowledge of other jobs in the plant. Supervisory employees were

(Continued on Page 93)



A mixture of fuel gases — largely propane — and oxygen react in an electrolyte within 1,008 fuel cells to provide the electricity that powers this experimental tractor.

Fuel Cells Develop 15 Kilowatts

A NEW SOURCE of electrical power — fuel cells — has come out of the laboratory to power a vehicle for the first time.

Allis-Chalmers demonstrated its fuel cell-powered tractor recently in Milwaukee. The research vehicle develops at least 3,000 pounds of drawbar pull, enough to pull a multiple-bottom plow.

Although the experimental fuel cell tractor is of commercial size, it still is a research vehicle. However, fuel cells of the future may provide electric power for homes and factories, vehicles such as trucks and buses, or even be used in military weapons or space vehicles.

The electricity that drives the tractor comes from 1,008 individual fuel cells. These are joined in 112 units of nine cells each. The 112 units are arranged in four banks and electricity can be taken

from any combination of the banks.

A mixture of gases — largely propane — fuels the cells. The gases are fed into the cells through a system of tubing and, once in the cells, the gases react in an electrolyte. A catalyst coating the electrodes of each cell aids the reaction.

The chemical reactions within the cells cause a direct current to flow through an external circuit which is connected by bus bar to a standard controller.

The compact controller, measuring 8 by 11 by 21 inches, regulates the electricity supplied to a standard 20-horsepower d-c motor.

The controller permits the tractor driver to regulate speed or reverse the tractor's direction by moving two levers. Using the speed control, the operator places the four banks of cells in series or

parallel, varying the amount of current going to the motor. To reverse the tractor, the driver moves the second lever, changing the polarity of the current flow to the motor.

In field tests, the tractor pulled a two-bottom plow through dry, hard ground. The tractor carries its gas supply in tanks mounted in brackets on the vehicle.

Allis-Chalmers Research Division developed the prototype of the fuel cells used in the tractor. The company announced its fuel cell a little more than a year ago.

Since then, researchers have developed the larger, more efficient fuel cells recently demonstrated. A team of about 20 engineering scientists in the research laboratories built the fuel cell installed in the tractor.

The fuel cell instantaneously converts chemical energy to elec-

trical energy — direct current. The chemical energy is in a mixture of fuel gases — largely propane.

In the fuel cell, the mixture of fuel gases is fed to the anode electrode and adsorbed by the catalyst on the electrode. It is activated there and reacts in the electrolyte.

This reaction releases a stream of electrons (direct current) to the external circuit.

Meantime, oxygen is adsorbed at the cathode electrode and it reacts with an electron from the external circuit and with the electrolyte, thus reforming the ion which was used up at the anode electrode.

The overall reaction is the consumption of the fuel gases to yield water and carbon dioxide and produce a flow of electrons (direct current) through the external circuit.

The power unit is composed of 1,008 cells, each one-fourth inch thick and 12 inches square. Cell voltage is one volt open circuit. Total output is 15 kilowatts.

Background and Future

Research scientists and engineers in a number of large companies are now looking to the fuel cell as a more efficient method of converting chemical energy to electric energy.

As a device which provides direct current power, the fuel cell resembles other electric cells but has a considerably higher efficiency. Like all batteries, it consists essentially of electrodes and an electrolyte. Conventional storage cells, however, have their energy stored in the electrode-electrolyte system within the cell, whereas the fuel cell can store no energy within the cell itself.

The fuel cell instantaneously converts chemical energy to electric energy. A fuel, such as hydrogen, supplied from an external source can furnish this chemical energy. In theory, a fuel cell can supply electric power as long as the fuel supply lasts. In the past, fuel cell performance left much to be desired because of the difficulties associated chiefly with unfavorable chemical reaction rates.

What was probably the first fuel

cell was described by Sir William Grove in 1839. The cell operated on hydrogen and oxygen. Fifty years later, in 1889, particularly good results were reported by Ludwig Mond and Charles Langer, who obtained a relatively high current density of six amperes per square foot with essentially the same type cell. In 1921, Professor E. K. Rideal discussed "The Problem of the Fuel Cell" before The Faraday Society. A few of the more recent fuel cell investigators include O. K. Davtyan in Russia (1946), F. T. Bacon in England (1935 to the present) as well as scientists of the Pittsburgh Consolidated Coal and Coke Company, National Carbon Company and others in the United States.

Several types of fuel cells are being investigated. Among these are direct fuel cells utilizing solid fuel, semidirect cells which utilize gaseous fuel, and indirect cells utilizing an oxidation-reduction (redox) system.

Engineers see in the fuel cell a valuable energy conversion method through use of off-peak generator facilities to produce hydrogen and oxygen which can be stored, transported and utilized at will in fuel cells. Low voltage constant loads of such electrochemical processes as plating, water purification, galvanizing, electrolytic cleaning and electrolytic refining of metals could make use of this type of energy.

When the free energy of the reaction is converted directly into electric energy, as is the case in the fuel cell, there is no theoretical limitation on efficiency. The possibility of producing electric power directly from a fuel at an efficiency of 90 per cent is truly startling when compared to the best diesel engines, which are about 40 per cent efficient. Because the fuel cell does not involve heat but converts chemical energy directly into electric energy, it escapes the high heat engine energy losses.

Dual Purpose Guard Rail

TO PREVENT operatives and visitors from driving off the limits of the area provided for automobile parking, one company put up a guard rail or bumper composed of 3-inch pipe, bent to form smooth corners, and supported on pipe posts set in concrete. The entire rail was welded to form a continuous unit except at the designated driveways.

By welding bullplugs on the

ends of the rail, and tapping a connection into the pipe from the plant outdoor watering system, it was necessary only to attach faucets at desired points to have a water manifold onto which the yard maintenance man could tie in the hose to water the contiguous area. A drain plug, set in at the lowest section of the line, provided for its being emptied in case of freezing weather.

By ELTON STERRETT
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Instrumentation for Water Treatment Plants

By E. A. STRAHLENDORFF

Manager

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CONTROL and instrumentation of demineralization equipment was covered in the first article of this 2-part presentation — See SPI for November, P. 32. This final installment considers control and instrumentation of cold process softening and clarification units and hot-process-hot zeolite and sodium zeolite treatment systems. It will also take up the use of panelboards and new and interesting instruments recently introduced.

Cold Process Systems

Cold process systems, which are the oldest types of water treatment plants, today include a substantial amount of instrumentation. An example of this type of plant is a clarification system with a high-rate solids-contact clarifier being used to remove turbidity and color from a surface supply. The clarifier is followed by polishing filtration equipment and zeolite softening units. The controls and instrumentation on this plant include an inlet orifice meter of the transmitting type which contains an indicating, integrating and recording receiver.

This meter serves a dual purpose since it also controls the feed of chemicals to the clarifier. Control of the quantities of chemicals fed to this clarifier is essential to its performance as a coagulation machine. Control of the chemical feeders is effected by means of a timer operating off the meter contactor. This same meter can also control the removal of accumulated sludge from the bottom of the machine by operating a counter and timer which in turn operate blowdown and backflush valves.

Sometimes sludge removal systems are set up on an independent time cycle basis and are not paced off the inlet water flow meter. This

is especially true where flow variations are not marked. In such a case the water level in the clarifier is controlled by throttling a valve on the main inlet line to the unit. Control is from the air signal received from a displacement tube type level controller with air pilot.

Although the handling of chemicals, as far as rate of feed to clarifiers is concerned, is generally automatic, filling storage bins or hoppers is still usually accomplished manually. However, in larger plants automatic chemical handling systems are given serious consideration and vacuum or pneumatic type loading facilities are often incorporated in the design of the chemical feed equipment associated with large clarifiers.

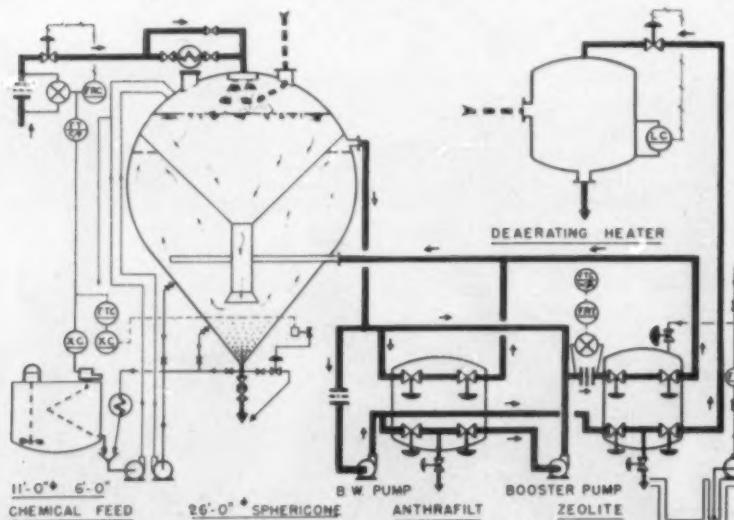
Today there is also a trend to use liquid chemicals where possible. In paper mills especially, the use of liquid alum and liquid caustic is quite common. These materials can be very easily handled automatically by means of rate of flow meters, rate of flow controllers or, where the flow of chemicals is small, by using positive displacement proportioning pumps.

Where the characteristics of the water being treated can vary widely and frequently, it has sometimes been found advantageous to incorporate pH metering equipment in the clarifier. The pH signal is fed to a controller which will increase or decrease the feed of chemical in order to adjust the pH. The reason for pH control is that proper clarification and color removal can be affected by pH variations.

Hot Process Systems

Hot-process-hot zeolite systems are quite flexible and can handle waters with widely varying characteristics. They can remove turbidity, alkalinity and silica and reduce hardness to virtually zero ppm. They treat water at substantially lower chemical opera-

Fig. 1. Automation for hot-process-hot zeolite system.



ting costs than the equivalent demineralization plant.

The instrumentation of this type system is similar to that of the clarification system just mentioned. Again there is a transmitting inlet meter, which controls a chemical feed system. A wet chemical feeder is generally furnished; that is, a slurry of lime is fed to the hot process sedimentation tank. Blowdown from the sedimentation tank again is automatically paced by the meter. Items such as temperature recorders and remote reading level gauges are often added to the design of large systems. Flow control is accomplished through a level controller throttling an air operated inlet valve.

Filters and softeners on a plant of this type are taken off the line for servicing (including backwashing, rinsing and regeneration in the case of the zeolites) no more than once a day. Very often the run lengths for the zeolite softeners are of several days duration. The use of automatic controls for operation of the valves during these servicing periods is harder to justify on hot-process-hot zeolite systems than it is on demineralization systems. However, automatic systems have been included in the design of a number of large plants.

In the arrangement shown in Fig. 1, backwashing of the filters and zeolite regenerations are push-button initiated. An automatic impulse sequence time cycle controller operates the valves. The filters are backwashed on a time-cycle basis and the zeolite softeners on the basis of volume of water treated. This volume is measured by totalizing meters either of the displacement or orifice type located on the inlet to each softener.

Regeneration with brine is accomplished automatically by using a wet salt storage basin which can receive carloads of salt. By means of pumps and meters the salt can be pumped in proper volume and concentration into the zeolite softener.

Sodium Zeolite Systems

The simplest type of ion exchange system is the sodium zeo-

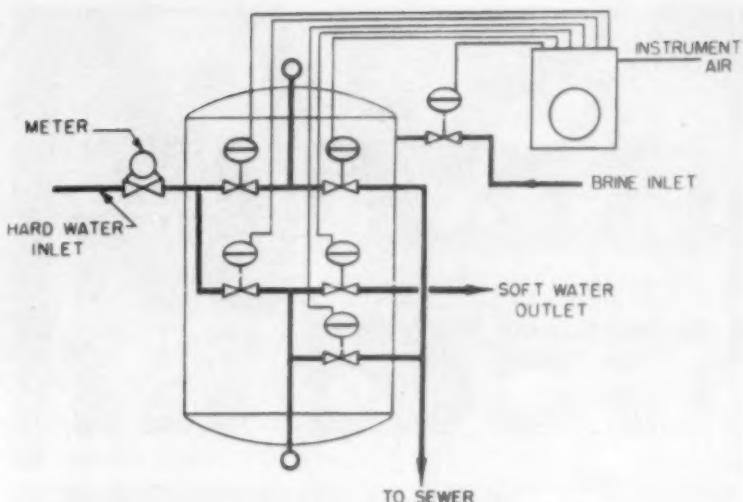


Fig. 2. Automatic sodium zeolite softener.

lite system. Where waters contain relatively high hardness, the regeneration period would be extremely short unless very deep beds of resin are included in the unit. Since there is a practical limit to the depth of the bed that can be incorporated in the exchange unit, it was often found that regeneration occurred too frequently and at times when it was inconvenient for the operators to attend to it. Therefore, automation of the regeneration of the zeolite softener was developed very early.

In the zeolite softener water is passed through a bed of granular organic resin particles which when exhausted are returned to the sodium state by contact with a dilute solution of brine. Initiation of regeneration can either be fully automatic or by push-button. The regeneration procedure includes backwashing, brine injection and displacement and final rinse.

Fig. 2 shows an individual valve nest automatically controlled by a sequence timer. The motor operated cam shaft in the sequential timer actuates the opening and closing of the air pilot valves within this instrument which in turn control the admission of air to the various valves in the operating nest of the zeolite unit.

The motor actuated timing disc controls the length of time of each step of the regeneration. It is also possible to control the regenera-

tion of a zeolite softener by means of an automatic multiport valve. Here a timing device would control the positioning of a pilot valve or in some cases the main valve itself.

In the past some attention was given to initiating regeneration of a zeolite softener based upon hardness leakage. Such devices are generally quite expensive and it has been found much simpler and cheaper to build a safety factor into the zeolite softener which will allow for normal variations of inlet water hardness.

Panelboards

There is a definite trend today to locate instrumentation of water treatment plants, especially in the case of demineralization systems, centrally on a single panelboard. Generally, these panelboards are purchased from the water treatment supplier as part of the plant.

The panelboards are factory assembled, wired and piped to terminal outlets. They are usually totally enclosed with access doors in the rear and provide illumination, etc. Only a few years ago, a water treatment plant rarely included more than a single sheet-metal board with open back and sides as a panel. But today, well planned, up-to-date panel installations are furnished.

Normally it is recommended that the control panel house the basic

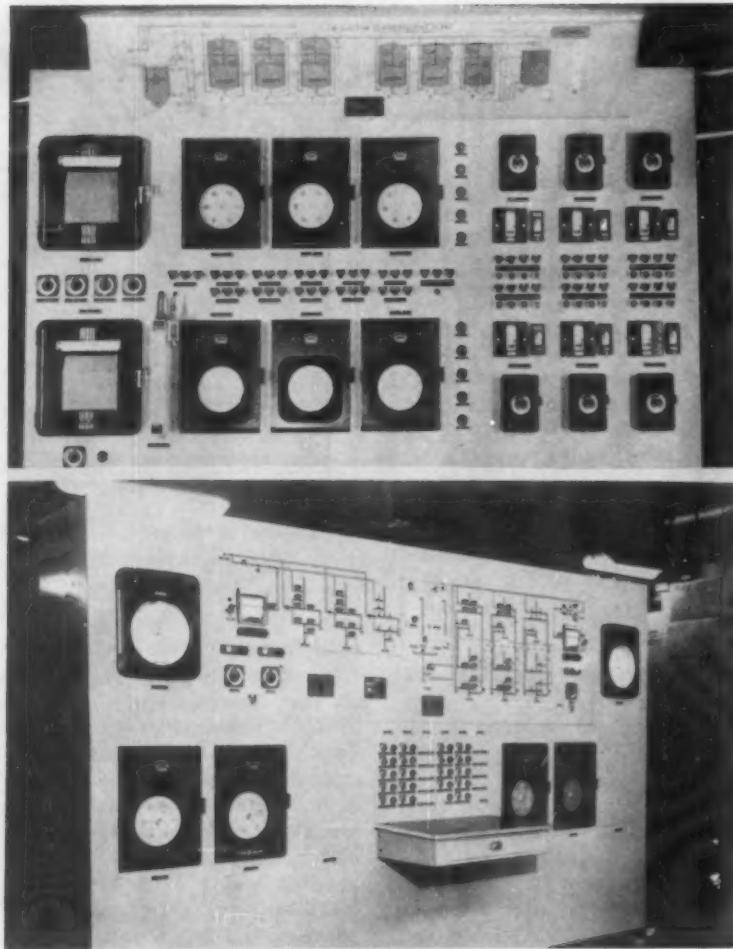


Fig. 3. (above) Control panel with flow sketch at top.

Fig. 4. (below) Graphic panel with valve positions indicated by lights.

flow recording and conductivity recording instruments and, where the plant is automatic, the sequence timers. Alarm lights and bells or alarm annunciators are incorporated on panels. A panel of one design is shown in Fig. 3. You will note that this particular panel includes a flow sketch at the top. The operator, when looking at the panelboard, will be better able to visualize what is actually going on in the demineralization system.

Carrying the idea of visualization somewhat further, control panels are furnished which include a graphic section as part of the design. Fig. 4 shows a typical graphic panel design in which the positions of all the main operating

valves (open or closed) are indicated by lights properly located in the flow diagram.

Fig. 5 shows a panel which was used for a mixed bed installation. It has a graphic section depicting the large two unit mixed bed demineralizer. It incorporates an alarm annunciator system, cycle controllers, flow recorders and conductivity recorder. In this mixed bed system there are some fourteen operations that must take place during regeneration of each mixed bed unit.

Recent Developments

A few fairly recent instrumentation developments have caused considerable interest in the water treating field. Some of the most

important of these will be discussed.

Silica Recorder.

For modern high-pressure boiler systems silica removal and silica end point control are all important. The laboratory determination of silica by standard analytical methods is time consuming. As boiler pressures have risen to 2,000 lb and above into the supercritical range (as high as 5,000 lb) there has been a great need for the development of an accurate silica measuring instrument that could be equipped with alarm contacts.

Recently, two silica measuring units have been introduced and are currently being marketed. Both units basically depend on the well known analytical principle of the formation of a silica-molybdate complex with subsequent development of a more intense molybdenum blue color by means of a reducing agent.

The silica indicating device requires that demineralized water be sampled and sent to it for the addition of the necessary reagents in the proper order with an allowance for reaction time between the addition of the various reagents. The sample, after maximum color has been produced, is passed to an automatic recording unit which will measure and record the intensity of a beam of light passing through it from a source of constant light intensity.

Monitor.

Because of the complexity of the valving and instrumentation of modern demineralizers, a number of central station utilities have seen fit to incorporate a monitoring device as part of the design of their automatic plants.

The use of such a device admits that, to a certain extent at least, the automatic control systems and the other instruments are subject to certain failures and maintenance problems. It is essential therefore to know when a particular item in the control system or in the valving system is not functioning properly. If this is known soon enough steps can be taken to prevent the introduction of poor quality water to a high pressure boiler system.

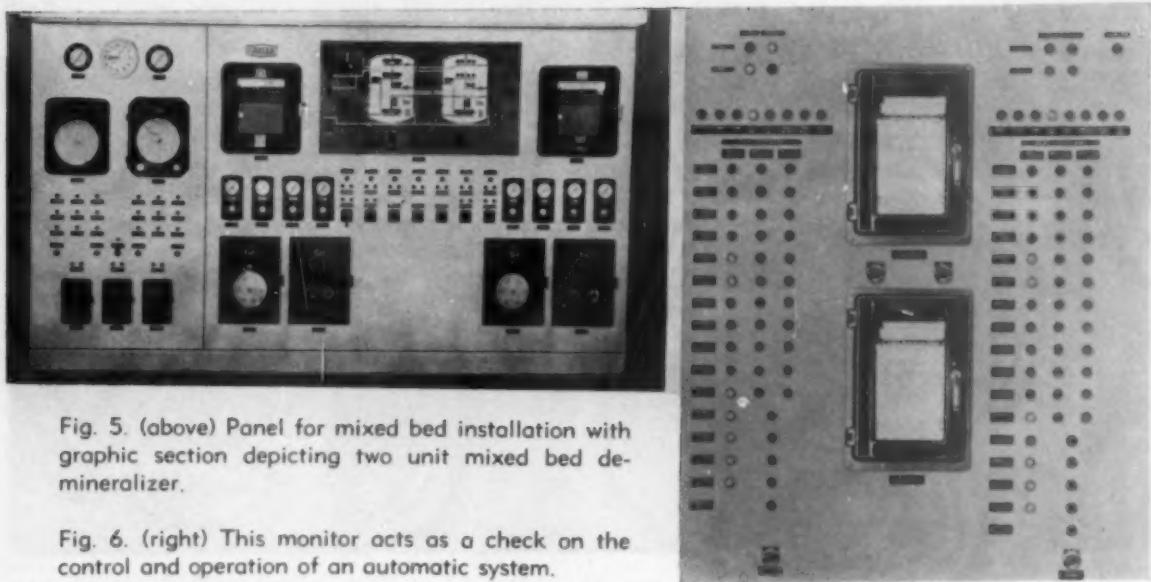


Fig. 5. (above) Panel for mixed bed installation with graphic section depicting two unit mixed bed demineralizer.

Fig. 6. (right) This monitor acts as a check on the control and operation of an automatic system.

The Graver Monitor shown in Fig. 6 can be furnished to act as a check on the control and operation of an automatic system. If valve operation or regeneration sequence is not in proper order or if a component of the automatic system is not functioning at all or not functioning properly, the monitor will receive an impulse from a feed back arrangement built into the control system which will indicate and locate the problem.

The problem can be indicated by an audible alarm or by a light, after which the monitor can shut down the plant.

The Graver Monitor panel has three groups of lights. One group shows whether the units are in service, regeneration, backwash or rinse. The second group indicates which step in the regeneration process is taking place if the units are being regenerated. The third group has a series of three lights which covers each valve, pump and other auxiliary system.

The first light in the three-light grouping will be lit when a specific valve, pump or other auxiliary is supposed to be open and running. The second light of the group will be lit only when the item is actually open or the pump is actually running. The third light, which is a red one, will go on when the item is not functioning in proper sequence, when a valve is not open

when it should be or is closed when it should be open.

In addition to the equipment included on this monitor, there can be operation recorder units, lamp test controls, and power failure indicators.

Solid State Controls.

Recently, in order to attempt to build even more reliability into demineralization control systems and to eliminate the problem caused by relays and switch contacts, which frankly have been the major problem of most automatic control systems, there has been considerable investigation into the use of solid state controls.

This type of system has been considered for at least one utility station which is currently under construction. There are two basic components that could be used in designing a solid state control system: magnetic switches or transistor relays. Since transistor relays are much cheaper than the amplifier required in a magnetic switching system, and since there are so many outputs in a complicated demineralizer set-up that have to be controlled, it has been found more practical to base the solid state design on the transistor.

Development of the solid state control system will eliminate some instrumentation problems and may leave the valves as the weakest

link in the control system. It remains to be seen whether the additional reliability gained here is really worth the added expense.

Carrying the solid state concept one step further, it has been suggested recently that water treatment plant controls (particularly demineralizer controls) be incorporated on power station master plant computers.

Tape Analyzer.

A good example of automation in the power plant chemical laboratory which will probably grow into a plant operating control is the recently developed Tape Analyzer.

It is the procedure for the plant chemist to periodically test one or more points in the water cycle (especially condensate) to determine the degree of metal pickup from piping, pump impellers, heat exchanger tubes and other sources. This has been accomplished by running a sample of known volume through very fine filter paper and then either visually inspecting the residue on the filter paper or burning this filter paper and weighing the residue in an analytical balance.

The Automatic Tape Analyzer follows a time program in feeding a strip of filter paper through a sampling chamber so that the

(Continued on Page 92)



Mr. Ginn is shown addressing the Engineering and Operation Section Conference of SOUTHEASTERN ELECTRIC EXCHANGE in Atlanta, Georgia, Oct. 15. The following article is abstracted from his paper which discussed plans for continued improvement in economy of power generating plants.

POWER GENERATION --

THE CHALLENGE facing the electric utility industry today is to keep the cost of power low. Meeting this challenge will require a continuing, all-out effort even greater than in the past by both the electric utility industry and equipment manufacturers.

While hydro-electric generation is an important segment of our power generation facilities, it has over the years become a smaller percentage of the total, Fig. 1.

By far, the major portion of our present generating facilities is the fossil-fuel-fired, steam-electric generating plant, and will continue to be so for many years to come.

Two major trends in steam-electric generation plants have largely accounted for the continuing decrease in power generation costs — first, increases in

By **W. S. GINN**
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the capacity of generating units, and second, improvements in power plant efficiency.

Maximum and average kilowatt ratings of turbine-generator units have increased rapidly during recent years, Fig. 2. Today, the utility industry has in service tandem-compound units rated 275,000 kw, and a cross-compound unit rated 335,000 kw. The use of these larger capacity generating units has resulted in an appreciable reduction in installed cost per kilowatt, and also has reduced operating and maintenance costs.

The gains that have been made in coal consumption to produce

kilowatt-hours throughout the years, both in the national average coal rate and in the best unit coal rate, Fig. 3, have been achieved largely by the use of higher steam conditions and the reheat cycle.

A striking example of what has been accomplished in over-all plant heat rate is illustrated in Fig. 4, the data for which is based on Federal Power Commission reports on "Steam-Electric Plant Construction Costs and Annual Production Expenses."

In the past, expansion of generating capacity of most power systems has been accomplished principally by the addition of the

highest efficiency generating units that could be economically justified, and in the largest ratings compatible with the cost of providing reserve capacity. Each new unit initially operated at high-load factor in base-load service. As newer, more efficient, generating units were added to the system, the older units were relegated to lower and lower load-factor operation and, finally, to reserve status.

Better Heat Rates

Improvements in station heat rates were being achieved rapidly, and the industry realized large fuel savings by the installation of the higher-efficiency generating units for high load-factor operation.

The result of this method of capacity expansion for a typical system is that the base load is carried by units having approximately 9600 Btu per kwh heat rate; the intermediate portion by

units of 12,000, or higher, Btu per kwh, and peak loads by units of perhaps 15,000, or higher, Btu per kwh.

Today's Challenge

If expansion of generating facilities were continued in this traditional manner for, say, the next fifteen years, the pattern of generating unit characteristics would probably be similar to that mentioned above. But the newest units on the system would then have a heat rate considerably better than today's best units, today's best units would be operating at relatively low load factor, and even the peak load would be carried by units of quite low heat rate.

Today, however, new types of generating units are becoming available which can achieve even greater over-all system generation economy in the future than could be achieved if the traditional pattern of adding only high-efficiency base-load units were followed.

1—For the peak portion of the load, low cost *gas turbines* are now available.

2—For the intermediate portion of the load, to better fit many daily load cycles, *spinning reserve steam turbine-generators* have been developed.

3—And finally, for the base-load portion, *higher - efficiency steam turbines* using more advanced steam conditions, and the *combined steam-gas turbine* coal-burning plant must be made available.

In the future is *nuclear power*.

Each of these generating-unit types, embodying new concepts, has its place in meeting the portion of the load for which it is best suited; and their availability indicates the future trend the industry should take to reduce power generation costs.

1—PEAKING GAS TURBINES

Many systems have high peak loads which generally last a total of only a few hundred hours out of a year.

Generation designed to meet this type of load must have low installed cost because capital charges constitute by far the largest part of the cost of such generation. Further, the units employed for these peak loads must have low operating and maintenance costs, and must require little attention for most of their lives. Efficiency is of minor importance, because of the few running hours.

Studies of many kinds of gen-

Trends and Challenges

Every engineer should find this article interesting and serviceable because power cost is closely identified with industrial plant operation and planning.

Fig. 1—U. S. installed generating capacity . . . hydro and steam

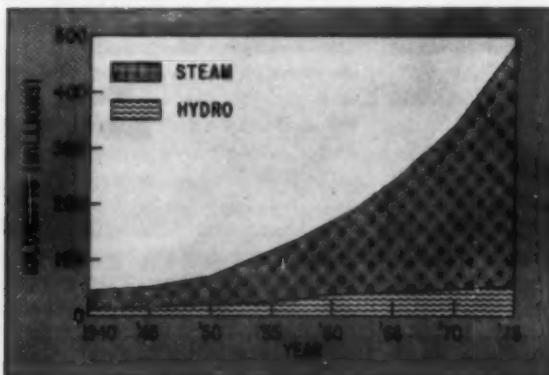
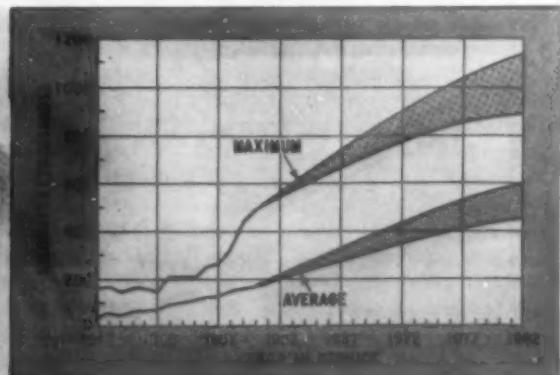


Fig. 2—Maximum and average kilowatt rating increases . . . 1947-1982



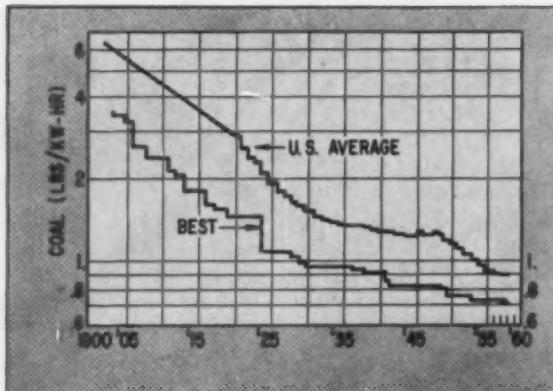


Fig. 3—Steam turbine coal rate; U. S. average and best

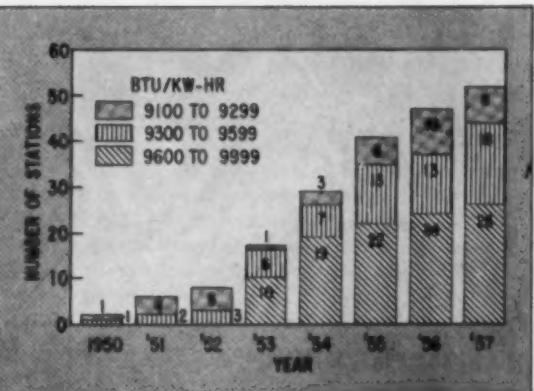


Fig. 4—U. S. steam-electric plant heat rates below 10,000 Btu per kwh . . . 1950-1957

erating units which could meet these requirements have convinced us that a gas turbine unit is the logical answer. Such a plant was recently purchased by the Philadelphia Electric Company. It will use distillate oil as fuel. The net output of this plant will be 20,000 kw to 27,000 kw, depending upon ambient temperature. Similar smaller plants with unit outputs of 10,000 kw to 13,000 kw are readily available.

The plants are compact, complete units, easily installed at any point on a system, and larger capacities can be obtained by placing more than one unit in each plant. Thus peaking loads can be satisfied in 10,000-kw increments as needed.

In terms of investment cost, such plants now can be placed in operation for around \$110 to \$120 per kw, and they will cost less in the future.

They will have very low operating costs. Units can be placed on the line within only 10 to 20 minutes of an anticipated load demand. Also it is quite feasible to have the plants started automatically with pushbutton or remote control, so that constant human supervision would not be required.

Considerable experience in the design and application of all elements of this gas turbine equipment for either oil or gas firing has been accumulated. Today, nearly 2,000,000 kilowatts of similar gas turbines are in operation in this country. A number of them are on utility systems.

The type of generation just discussed fits the very short-time peak requirements. The longer time high daily load demands, which add up to many hours for the full year, require a second type of unit.

2—SPINNING-RESERVE UNITS

A new type of unit has been conceived which combines the characteristics of a high-efficiency base-load generating unit, with an added good efficiency, short time capacity to be used during the daily maximum-load demands. It is more expensive, but more efficient, than the gas turbine unit; and less expensive, but also less efficient, at maximum output, than base-load generating units.

This SPINNING - RESERVE GENERATING UNIT utilizes several characteristics of the complete power plant equipment which, in the past, have not been fully exploited. Today, technical progress in materials and designs permits an output greater than that established by optimum efficiency. For example, a turbine can be designed for a maximum-efficiency base capacity of 1.0, with an excellent base heat rate. But this turbine can also be made to deliver 30 to 40 per cent more output at a heat rate 15 to 20 per cent poorer than the base.

Studies of methods of matching this turbine characteristic with boiler characteristics have indicated that additional, short-time boiler capacity of a comparable amount may be available, particu-

larly in the case of coal-fired boilers, by overfiring the boiler, provided that its firing rate is returned to normal in time to prevent the accumulation of permanent slag deposits in certain portions of the boiler.

If these over-capacity characteristics of the turbine and the boiler are properly combined in the station design, often reserve margin in station auxiliary equipment can also be applied to the over - capacity operating period without adding capital cost.

When these characteristics of the turbine-generator, the boiler, and the associated auxiliary equipment of a generating plant are exploited, they can offer, with a coal-fired boiler, added capacity, above the base-load, high-efficiency capacity. This incremental capacity can be obtained with attractive savings.

Such a unit, as stated, will have an excellent base-load heat rate, equivalent to the heat rates available currently for units of the same base-load capacity. It also will have a favorable heat rate for the incremental capacity when this heat rate is compared with the heat rate of units 10 or more years of age now performing in the range between peak and base load.

Capital costs rule against this unit for peak loads alone. However, operating costs will be close to those required for the base-load operation of the unit, and therefore to a substantial degree, the spinning-reserve capacity will be obtained at low or, perhaps, no

incremental operating cost.

The spinning-reserve capacity is, of course, essentially instantaneously available, because with the units in operation, loads can be increased at the normal rates for applying loads to large units.

3—HIGH EFFICIENCY UNITS

The third area of a utility's load curve requires turbine-generators for high-load factor, base-load operation. We are all familiar with the requirements of this type of generation, as historically, these kinds of units have been the ones applied to utility systems over the years.

Past gains in efficiency, illustrated by the familiar coal-rate chart, Fig. 3, and emphasized by the best heat rate plant chart, Fig. 4, have been accomplished by the use of improved power plant equipment, by going to higher pressures and temperatures, by improved steam cycles, by improved steam paths, and by the efficiency gains which larger capacities have brought with them.

Historically, the maximum steam pressures have doubled about every 12 years, and temperatures have increased about 12 degrees per year. Every step in this long period of progress has been economically justified because the gains in efficiency which resulted were worth more than their cost.

While it is true that the potential improvements in efficiency from forward steps in temperature and pressure of the steam cycle are decreasing as we approach theoretical limits, substantial gains still are possible in higher-capability units by going above today's level of 2400-psig, 1050-F initial steam conditions. Turbine technology has advanced substantially beyond these limits as evidenced by the successful operation for 2½ years of the 125,000-kw turbine-generator unit operating at 4500 psig 1150/1050/1000 F in the Ohio Power Company's Philo Plant.

Our present studies usually indicate that such higher steam conditions cannot be economically justified on the basis of present equipment costs.

In the search for more efficient means of power generation, many

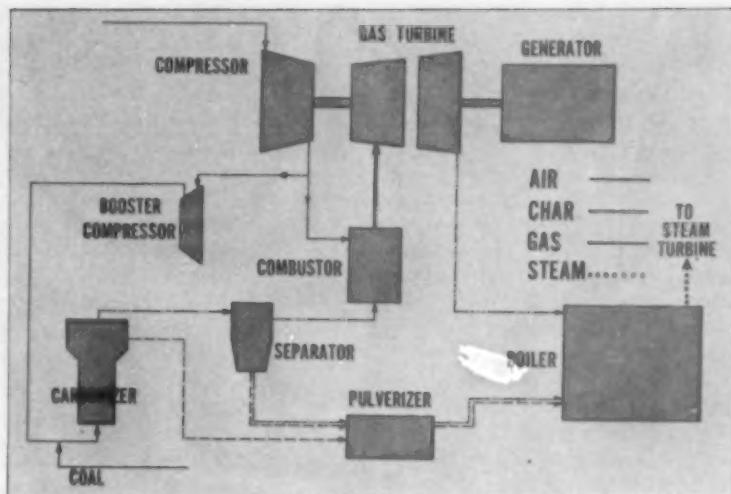


Fig. 5—Diagrammatic arrangement of exhaust-fired gas turbine cycle . . . with coal carbonizer

thermal cycles have been carefully investigated, and with one exception, these appear to offer no economical advantage over the present conventional steam cycle.

The coal-fired, combined steam-gas turbine cycle is the one exception which offers real promise for a new thermal cycle. When a gas turbine cycle is superimposed on the steam turbine cycle, efficiency gains in the magnitude of 5 per cent are quite feasible, and it is believed that they can be made economically attractive.

Equipment currently being developed for a coal-fired, combined steam-gas turbine cycle is shown diagrammatically in Fig. 5. This exhaust-fired cycle uses a coal carbonizer to drive gases off the coal to supply fuel to the gas turbine. The carbonizer also provides char to the boiler, so that all the coal used to supply gas turbine fuel is ultimately utilized in the full cycle. Two gas-fired plants of approximately 25,000-kw capacity, using natural gas rather than gas from a carbonizer, are now in operation. With the carbonizer, such plants will use only one fuel, coal.

The combined steam-gas turbine cycle is particularly attractive because it can capitalize on efficiency improvements in both the steam cycle and the gas turbine; therefore, it does not supplant the need for economical progress to higher steam temperatures and pressures,

but rather, augments it.

Looking into the future and considering the heat-rate gains possible by combining the high-efficiency steam turbine cycle and the steam-gas turbine cycle, substantial strides toward better base-load generating units are almost within grasp.

Nuclear Power

Nuclear power plants, because of their expected higher first cost and low fuel cost, will first become economically competitive as high-load factor, base-load generating units. While actual operating experience with large-scale nuclear power plants is extremely limited, several large plants are now under construction. One of these, the 180,000-kw Commonwealth Edison Co.'s Dresden Plant, using a dual-cycle boiling water reactor, is scheduled to go into service within the next several months.

Operating experience with smaller boiling water reactor plants has been most favorable, but considerable development work still must be done before their full potential can be realized.

1—Unit capacities of nuclear power plants must be increased to obtain low installed cost and lower operating costs.

2—Higher power-density reactors must be developed; plant designs simplified and made more compact; new containment ap-

proaches conceived; all aimed at reducing construction costs.

3—Fuel performance must be improved, by reducing fabrication costs, and by extending irradiation time.

Further, nuclear superheat offers potential savings. While savings in nuclear fuel cost with superheat possibly may be marginal, capital cost savings may be substantial, due to the increased plant output for the same steam flow and the ability to use more nearly standard turbine-generators and other conventional power plant equipment.

In a nuclear plant, while the fuel cost when first put in operation may be high, it is almost certain that in later years there will be considerably lower fuel costs. At the same time, the cost of fossil fuels may possibly increase. Thus, a nuclear plant may not be competitive when first operated, but a few years later may have lower total costs than would a conventional plant.

Cost of Power

Returning to fossil-fuel-fired steam turbine-generator plants, how will these new-concept turbine-generators and other elements in future designs affect the cost of power?

A typical breakdown of today's total generation costs for a modern steam power plant is shown in Fig. 6. The actual figures will vary widely in different parts of the country, but the relative magnitude of the major components, fixed charges on investment, operating and maintenance costs, and fuel costs, is representative.

Today fixed charges on investment account for approximately 50 per cent of the total cost of generation. Necessary turbine-generator price increases since 1955 were adverse to our common interests. However, as materials and labor costs rose, product costs rose with them. Now, however, reductions have been achieved, and prices of turbine equipment are today headed downward.

It has long been known that investment costs are a function of unit capacity, and costs decrease as capacity increases. A less well-known factor in the turbine-gen-

erator portion of this industry is that the same steps which enable manufacturers to build larger capacity units, often contribute to their ability to build simpler, smaller capacity units.

One such factor has been the continuing development of ever longer last-stage buckets to pass more and more steam flow through a given type of turbine. Today, with 29-in. last-stage buckets, 200,000-kw, 3600-rpm tandem-compound, double-flow units are possible.

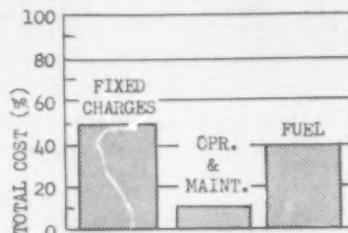


Fig. 6—Total generation costs for modern steam power plant

Paralleling this, 4-flow, tandem-compound units capable of delivering 400,000 kw on a single shaft are available today, and it is expected that the capacity of such units can be extended to 500,000 kw in the next few years.

Similar developments have taken place in 1800-rpm turbines. Here, last-stage buckets have grown in length from 30-in. to 43-in., and now under construction are turbines with 50-in. buckets. Combined with appropriate high-pressure, 3600-rpm turbine elements, or employed alone, these 1800-rpm developments make possible very large capacity cross-compound units, or large capacity 1800-rpm, tandem-compound units. A 600,000-kw, 3600/1800-rpm cross-compound unit is now on order, and shortly we will be able to build a 1,000,000-kw turbine-generator.

In the generator, progress to higher capacity is an accomplished fact. The recent development and successful application of conductor cooling has increased the output of generator frames a phenomenal amount. For example, the largest single-piece frame which can be handled by the American railroads was capable, in 1951, of producing

162,000 kva. Through the years this capability has risen to today's design level of 384,000 kva. We fully believe that this same frame, with water cooling, will, in a few years, deliver 500,000 kva.

This frame is only one, and not the largest in our family of generator frames. Today, the largest frame can deliver nearly 600,000 kva at 3600 rpm, and we expect that a single generator at this speed soon can be built to deliver 700,000 kva.

As a result of design and manufacturing progress, prices of General Electric's large steam turbine-generator units reversed their rising trend on July 10th of this year and started downward.

These price reductions range roughly from 2½ per cent to nearly 15 per cent as a function of unit capacity.

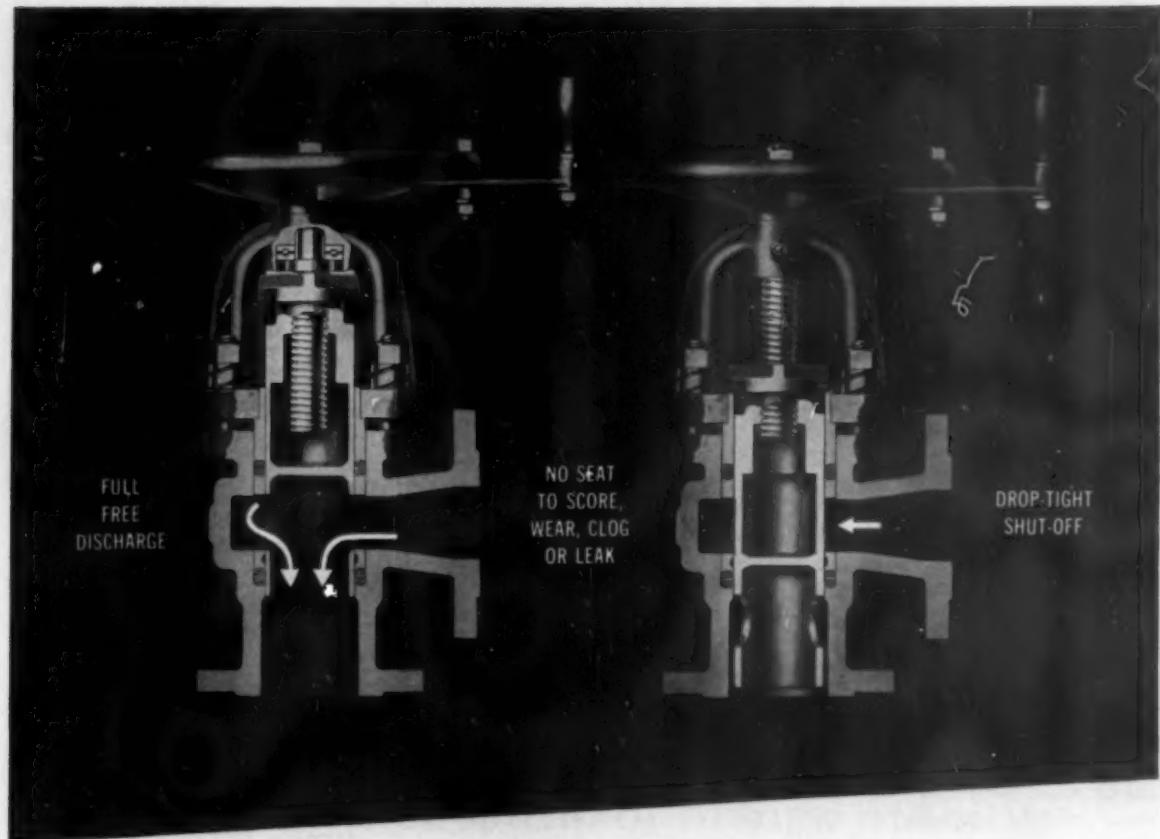
In addition to this, units were effectively reduced in price by modifying the price adjustment clause to waive the first 2½ per cent increase in prices resulting each year during the life of a turbine contract. This 2½ per cent is a significant figure in a long-shipment industry, because when applied to the average 3-year span between turbine-generator order and delivery of the unit, purchasers will save approximately 8 per cent of the delivered price.

Fuel costs account for approximately 40 per cent of the cost of power generation, Fig. 6. An improvement of 1 per cent in the efficiency of a generating unit is worth to the utility industry 60 cents to \$1.50 per kw of rating. For this reason, it is essential that the industry continue to move to the area of higher steam temperatures and pressures, and united efforts must be exerted to make such movement economically attractive.

Additional improvement in efficiency, when the gas turbine is superimposed on the thermal cycle of the steam turbine in the combined steam-gas turbine cycle, can well be worth an additional \$5 to \$6 per kilowatt of such capacity.

Availability

Neither large units with their contributions to reducing fixed charges, nor high efficiency with



open and shut case!

**...FOR TROUBLE-FREE PERFORMANCE WITH
YARWAY SEATLESS BLOW-OFF VALVES**

Mention Yarway Seatless Blow-Off Valves in more than 16,000 boiler plants, and you'll get solid approval—for these plants have first-hand *experience* with the dependable, trouble-free, service of Yarways.

For boiler blow-down service at all pressures up to 415 psi, YARWAY SEATLESS (in tandem) is the popular choice.

Outstanding feature is the famous seatless design—*there is no seat to score, wear, clog or leak*. Nitralloy hollow sliding plunger permits full, free discharge, yet keeps valve drop-tight in closed position. *No other blow-off valve has these features.*

Specify Yarway Seatless Valves when ordering new boilers and when replacing worn or inefficient blow-off valves on your present boilers.

Yarway Bulletin B-427 gives full information. Write for it today.

YARNALL-WARING COMPANY

*Home Office: 116 Mermaid Ave., Phila. 18, Pa.
Atlanta Office: Bona Allen Bldg., Atlanta 3, Ga.*



low fuel cost, is of any value if the machines incorporating these improvements are not available to deliver power when needed.

In this country steam plants using equipment of American manufacture customarily have had availabilities of about 90 per cent of the hours in the year. The 10 per cent outage time is accounted for by about 8 per cent planned outage, and 2 per cent forced outage.

Studies on the economics of reserve capacity needed for power systems have shown that should the forced outage rate increase from 2 per cent to 3 per cent, 5 per cent more generating capacity would be required to maintain the same excellent customer service rendered today.

Expressed another way, an increase of 1 per cent in the forced-outage rate of a 200,000-kw turbine-generator would call for an added investment of about \$1,500,000 in spare equipment.

Each time availability in terms of forced outage decreases, capacity must be added. Not only must reserve capacity be increased, but also the cost of generation to replace the high-efficiency generation of a base-load unit out of service is expensive. Using an average figure of 8 cents per kilowatt, it would cost about \$16,000 a day to have a 200,000-kw base-load unit out of service.

American turbine-generator builders are well aware of these figures and have designed their units for maximum reliability and minimum forced outage. We also have recognized the need to return units promptly to service during normal maintenance periods, and to a much greater extent, the need to service them with speed and accuracy when they are in distress.

Automation

Another important contribution to reliability lies in the field of automation. Some generating units now under construction will be almost completely automated.

Such plant automation will include starting and stopping; normal and emergency operation of the turbine-generator, boiler, and major auxiliary equipment; and in addition, it will provide automatic

data logging and heat computations.

Generating units under the control of digital computers will be operated under the most favorable predetermined conditions which will subject them to the minimum possible human error. Maintenance costs should be reduced because of this better treatment of equipment. Higher unit availability will permit installation of less reserve capacity, and more economic operation should result from better knowledge of operating conditions, which will lead to fuel savings.

As turbine-generator units increase in capacity, reserve requirements must also be increased to maintain a constant standard of service reliability.

These reserves can be provided by installing more generating capacity, or by a combination of installing some generating reserve and providing the remaining needed reserve by interconnections with adjoining power systems.

It has been shown that a 200-mile interconnection carrying no load, except in an emergency, often can be justified between two 1,000,000-kw capacity systems solely on the basis of using larger capacity generating units than would otherwise be economical.

In a particular case, study of the interconnection of two 1,600,000-kw systems by a 200-mile transmission line, saved about 9 per cent in over-all system cost,

as each system was assumed to grow to 6,400,000 kw in 20 years. About two-thirds of this saving resulted from pooling reserves, and the remainder came about through the use of larger generating capacities.

Conclusion

We have reviewed some of the steps that the equipment manufacturers have taken and intend to take to keep the cost of power low.

1—For peak-load application, we believe the gas turbine generating unit will result in appreciable savings in power generation.

2—For the intermediate-load range, the spinning reserve units with high-efficiency, base-load rating, plus extra short-time capacity to meet daily peaks, may be an economical choice.

3—For base-load service, we intend to pursue aggressively the paths of economic use of advanced steam conditions; of larger generating unit capacities; the development of the coal-fired steam-gas turbine cycle; and the development of nuclear power.

The challenge facing all of us today is to advance these new concepts as rapidly as possible, and to make optimum use of these new developments. We have faced similar challenges in the past and have met them successfully.

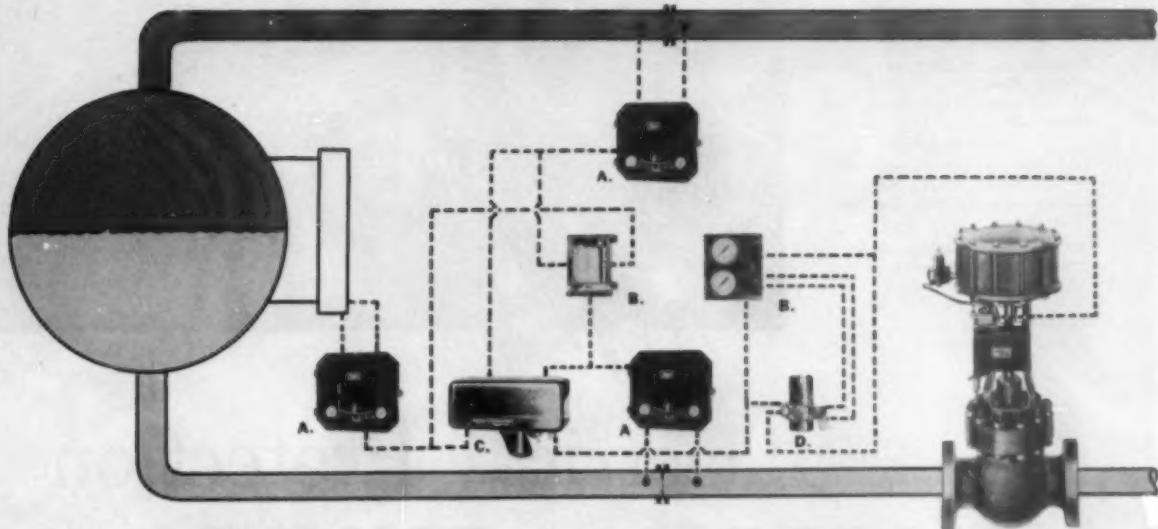


UNIVERSAL POSITIONING FIXTURE

Assemblers at Temco Aircraft Corporation, Dallas, Texas, use a simple positioning fixture for small, intricate jobs. The swivel ball joint and tightening screw permits workers to work on small surfaces held at various angles. In the photo, a small vise has been attached to the positioning fixture while some soldering work is being done on a component.



How Copes-Vulcan control systems boost power plant efficiency



Copes Feedwater Control brings stability to high-duty steam generators

To meet the higher ratings and fast load changes of today's boilers, Copes Type 3-L Feedwater Control combines the dynamic balance of custom-engineered control valves with precision-built instruments.

Feed to the boiler is modulated by steam flow, feedwater flow and drum water level. Feedwater input closely matches steam output on constant or varying loads. A stabilized water level is maintained regardless of changes in load or feed pressure, and while blowing down or blowing soot.

A complete line . . . a complete service

Over 50 years of design experience backs Copes-Vulcan's broad line of control systems for boiler cleaning, combustion, feedwater, pressure reducing and desuperheating operations.

For details, write for Bulletin 1013-D

A. Indicating transmitters send water level and flow influences to the computing relay where steam-flow and water-flow are accurately balanced.

B. Miniature recorders and transfer panel for console-type or graphic panels or for compact grouping on existing panels.

C. Compact beam-balanced type computing relay sends an air impulse to the controller and auto-manual transfer panel.

D. Transet controller provides two-knob tuning. Controller, transmitters and relays may be field mounted wherever most convenient.

E. Copes-Vulcan Type CV-P valve responds to minute changes in actuating impulse, delivers top power at the valve stem. For less demanding service Copes-Vulcan builds a diaphragm operated valve.

Copes-Vulcan Division

BLAW-KNOX COMPANY

Erie 4, Pennsylvania

THOMAS JEFFERSON
BUILDING

Electrical services are fed from two 4,000 amp. main distribution boards. Each of the main switch boards is fed by 8-500 MCM conductors per phase.

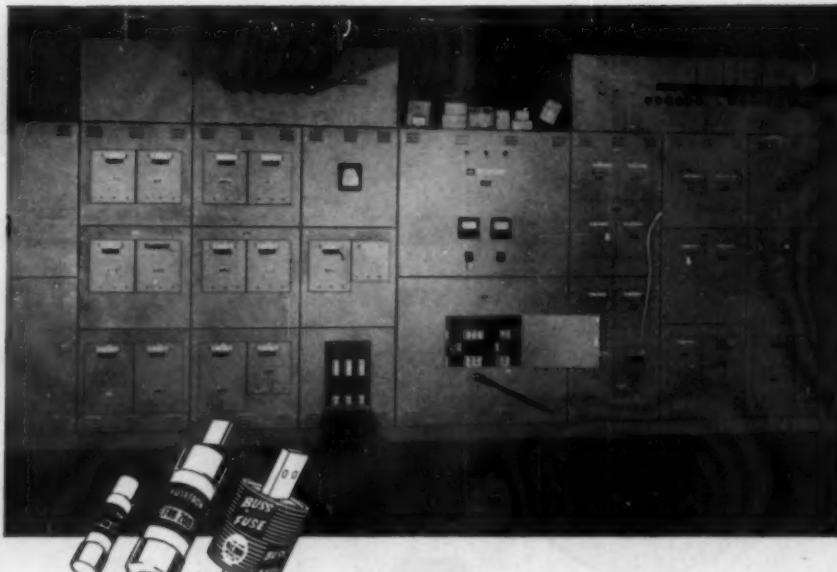
Switch Board #1

Protected by: 3-4000 amp. BUSS Hi-Cap Fuses . . . 12-600 amp., 30-400 amp., 3-200 amp. FUSETRON Fuses.

Switch Board #2

Protected by: 3-4000 amp. BUSS Hi-Cap Fuses . . . 6-600 amp., 33-400 amp., 39-200 amp. FUSETRON Fuses.

All distribution panels protected by FUSETRON dual-element fuses.



Electrical Protection goes MODERN with BUSS Fuses *in St. Louis' Newest Multi-Storied Office Building . . .*

The Thomas Jefferson Building is another outstanding example of BUSS Hi-Cap and FUSETRON dual-element fuses meeting the requirements for a modern protective device for use in modern electrical systems.

Today's electrical networks, with their tremendous capacities, have emphasized the need for a superior protective device that can be relied on to safely and dependably handle faults of great magnitude.

BUSS Hi-Cap and FUSETRON fuses, because of their high interrupting capacity and life-time dependability have become the natural choice in both new installations and when electrical systems are being modernized.

WHY HIGH-INTERRUPTING CAPACITY AND DEPENDABILITY ARE ESSENTIAL FOR A MODERN PROTECTIVE DEVICE . . .

CAPACITY

The magnitude of fault current is only limited by the capacity of the transformers or networks.

These capacities have been increasing yearly — and most likely will continue to increase.

A modern protective device, therefore, must be capable of interrupting faults of 75,000 to 150,000 ampere which are available today — and be adequately safe to allow for future system growth.

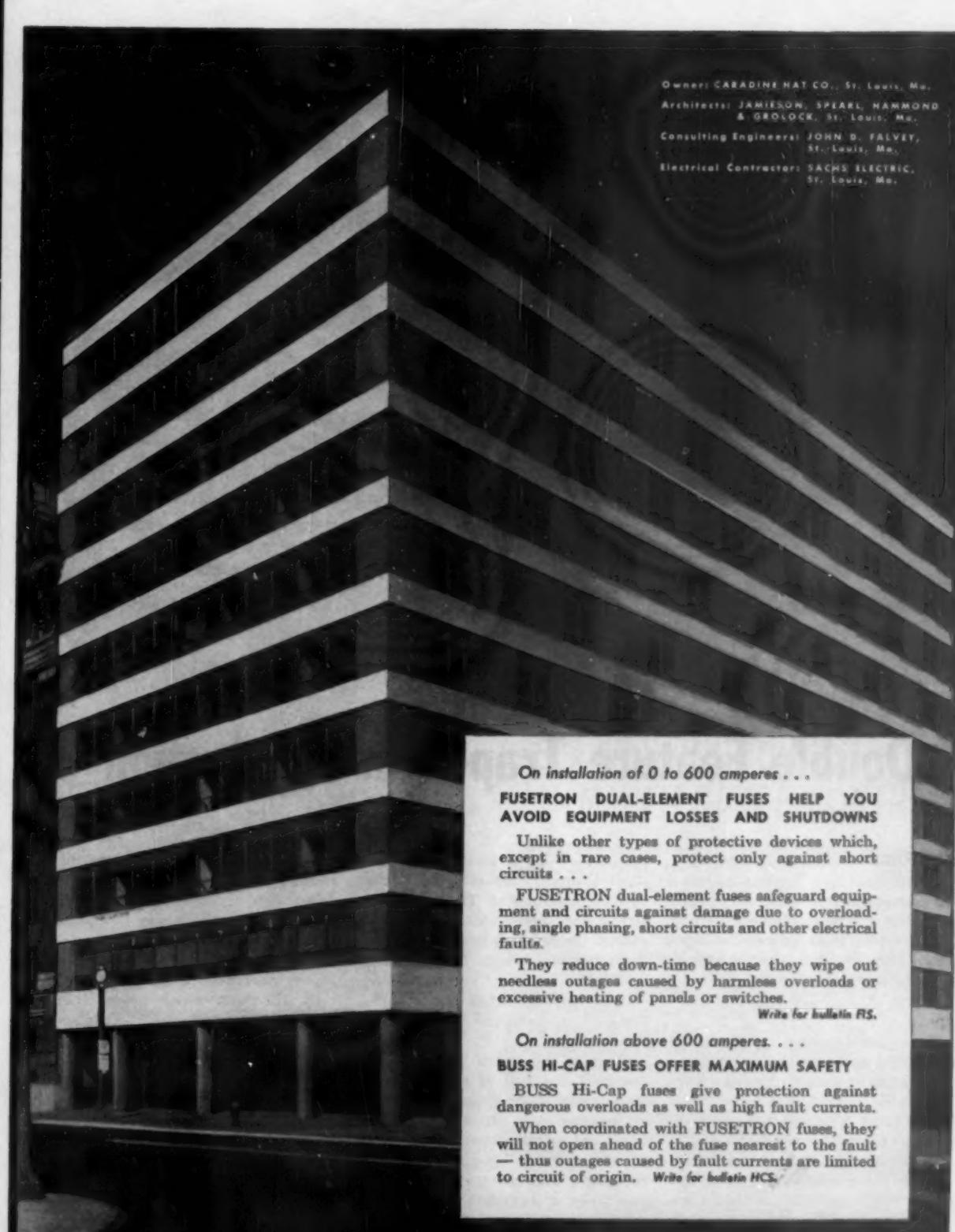
BUSS Hi-Cap and FUSETRON dual-element fuses meet this requirement. The interrupting rating of BUSS Hi-Cap fuses is 200,000 rms symmetrical — and for FUSETRON fuses it is 100,000 rms symmetrical.

LIFE-TIME DEPENDABILITY

The *Modern* protective device should remain just as safe and accurate through the years as it is on the day installed. Otherwise, how can you be sure it will interrupt these high fault currents should trouble occur 10, 15 or 20 years from now.

This requirement too, is met by BUSS Hi-Cap and FUSETRON fuses — They remain safe and accurate and require no periodic inspection or re-calibration, as they have no hinges, pivots, latches or contacts to stick or get out of order.

ANOTHER BUSS HI-CAP AND FUSETRON FUSE INSTALLATION



Owners: CARADINE HAT CO., St. Louis, Mo.
Architects: JAMIESON, SPEAR, HAMMOND
& GROLOCK, St. Louis, Mo.
Consulting Engineers: JOHN D. FALVET,
St. Louis, Mo.
Electrical Contractors: SACHS ELECTRIC,
St. Louis, Mo.

On installation of 0 to 600 amperes . . .
**FUSETRON DUAL-ELEMENT FUSES HELP YOU
AVOID EQUIPMENT LOSSES AND SHUTDOWNS**

Unlike other types of protective devices which, except in rare cases, protect only against short circuits . . .

FUSETRON dual-element fuses safeguard equipment and circuits against damage due to overloading, single phasing, short circuits and other electrical faults.

They reduce down-time because they wipe out needless outages caused by harmless overloads or excessive heating of panels or switches.

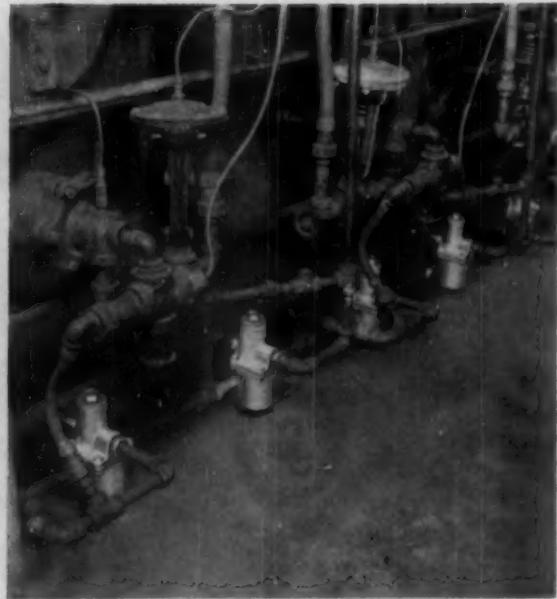
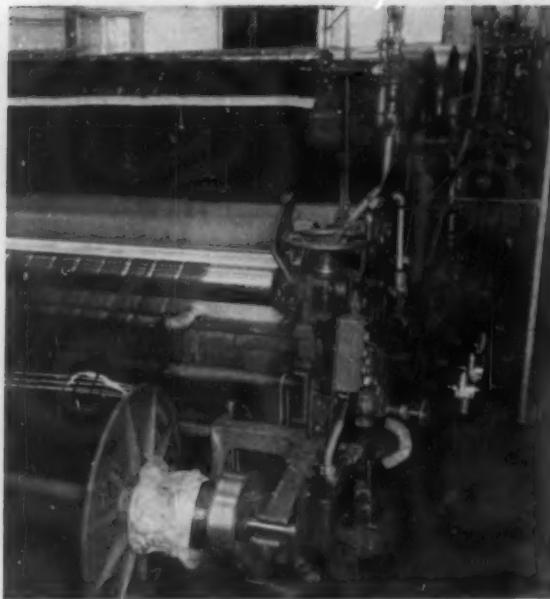
Write for bulletin FLS.

On installation above 600 amperes . . .
BUSS HI-CAP FUSES OFFER MAXIMUM SAFETY

BUSS Hi-Cap fuses give protection against dangerous overloads as well as high fault currents.

When coordinated with FUSETRON fuses, they will not open ahead of the fuse nearest to the fault — thus outages caused by fault currents are limited to circuit of origin. *Write for bulletin HCS.*

BUSSMANN MFG. DIVISION, McGraw-Edison Co., ST. LOUIS 7, MO.



The view at left shows a slasher at the Elmore plant with the traps at the right just above the floor. The right hand view shows in detail how the traps are connected with the piping. Seven traps are used for the one slasher, which experience has shown to be the right number for this equipment.

Quick Heat for Slashers at Spindale, N. C.

Double Feature Trap Aids Production

SLASHERS at the Elmore Corporation, Spindale, North Carolina plant handle warps of rayon, nylon and other synthetic filament yarns and therefore must operate at low temperatures so that when the machine is stopped to repair broken ends, or other purposes, it cools rapidly.

Consequently, when the slashers are started up again large amounts of condensate have formed during the cooling period, and quantities of air have accumulated in the drums. For these reasons it is essential that the steam traps both remove the condensate and vent the air very quickly so that the proper temperature will be restored with minimum loss of time and production.

Heat-Kwick traps, manufactured by V. D. Anderson Co., accomplish this result so well that

production of the slashers can be started almost instantly after one of these shutdowns. The trap, designed for steam industrial processing, includes inverted bucket traps combined with thermostatic features. That is, they have the conventional inverted bucket orifice and an auxiliary bellows orifice.

Thus, if the steam heated units are cold and full of air, the bellows orifice is wide open and vents all the air very quickly. At such times (when the steam heated unit is cold) a large amount of steam condenses and the pressure drops just when it is needed to force the condensate through the orifice of conventional traps. With the specially designed process steam traps, however, the large amounts of initial condensate cool a second auxiliary, bellows orifice which

opens instantly and discharges the condensate. In this way the condensate is removed and the air vented from the slasher with almost negligible loss of time.

Due to this fast performance these traps need a trap factor of only 1½ to 2, which means that a relatively small size is satisfactory. The piping inlets and outlets of the traps are in a horizontal plane. This permits the traps to be installed in the pipe line without using extra fittings as would be required, for example, if the traps had inlet and outlet connections at the top and bottom.

With this type of trap it is also possible to remove its body by simply taking off four bolts when it is necessary to make an inspection or replace the valve or seat, without disconnecting any pipe or removing trap from the pipe line.

**NOW
OPERATING
FLORIDA'S FIRST
STEEL FURNACE**

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& ROLLING MILL



Checking, inspecting and adjusting mechanism used in plant's electrical system.



Westinghouse furnishes a written report of the condition of all electrical equipment and recommendations on parts and repairs.

**"now operating" . . .
with a WESTINGHOUSE
MAINTENANCE CONTRACT**

Florida Steel Corporation in Tampa, Florida, started operations in September, 1958.

Mr. R. R. Black, Sr., General Manager, contracted with Westinghouse for a complete maintenance inspection and engineering service on a quarterly basis. He reports, "Our experience to date has proved to us that our Westinghouse Maintenance Contract has already paid for itself many times. Down time is at a minimum, and when troubles develop, we are assured of fast, capable service."

You can now have a Westinghouse maintenance engineer check and test all of your electrical equipment under contract—weekly, monthly or yearly, depending on your needs. These scheduled inspection recommendations and adjustments can prevent equipment failure, reduce outages and down time to a minimum.

For complete information, call or write Westinghouse Electric Corporation, 1299 Northside Drive, N. W., P. O. Box 4808, Atlanta 2, Georgia. J-96206

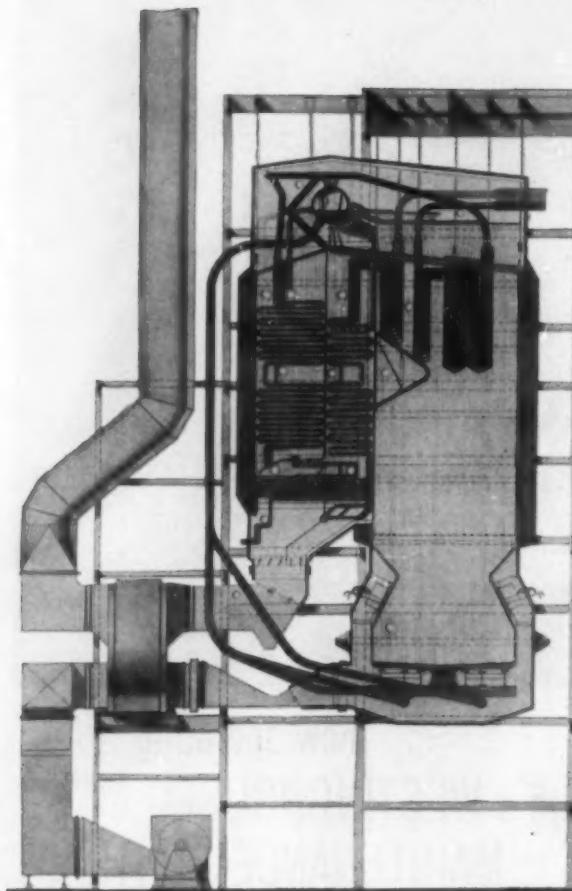
YOU CAN BE SURE . . . IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOW" CBS-TV FRIDAYS

Contract service offered in Westinghouse Southeastern Region Only.

How The RILEY TURBO FURNACE



Texas Public Utility — 1,200,000 lbs/hr
1005/1005F; 2125 psig — Gas or Oil Fired

A FEW TURBO FURNACE CENTRAL STATION BOILERS INSTALLED AND UNDER CONSTRUCTION

*Delaware City Power Station

Delaware Power & Light Company
Delaware City, Delaware
Units No. 1, 2, 3

*Pearl River Basin Steam Electric Station

Texas Electric Services Company
Mehanah, Texas

*Sterlington Steam Electric Station

Louisiana Power & Light Company
Sterlington, Louisiana

Rockwell Station, Unit No. 8

Manila Electric Company
Manila, Philippine Islands

Midland Steam Electric Station

Unit No. 2
New Orleans Public Service, Inc.
New Orleans, Louisiana

*North Lake Steam Electric Station

Dallas Power & Light Company
Dallas, Texas
Two (2) Boilers

*Tunica Unit No. 4

Florida Power Corporation
Enterprise, Florida

*Little Gypsy Steam Electric Station

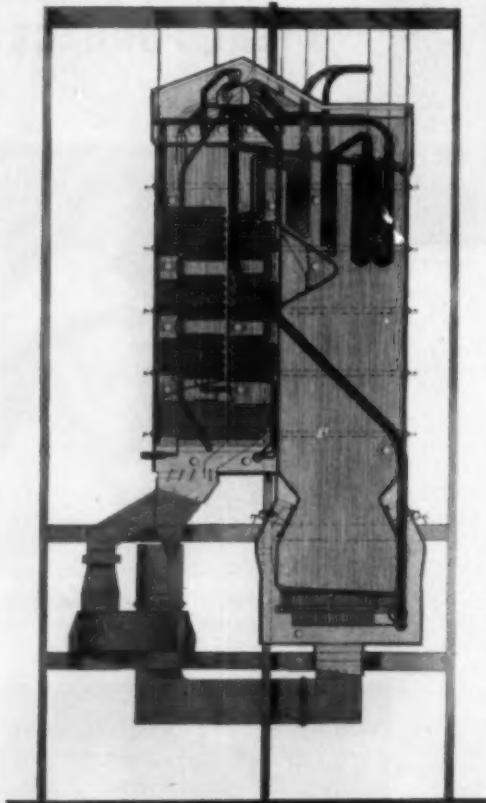
Louisiana Power & Light Company
Little Gypsy, Louisiana

Agua Fria Station, Unit No. 3

Salt River Power District
Phoenix, Arizona

*Installed

- Permits the use at any time of the most economical fuel available — a wide range of coals, lignite, fluid coke, natural gas, blast furnace gas, oil.
- Complete burn out of all combustible material virtually eliminates combustible loss.
- Nearly equal furnace performance with oil, gas or coal firing simplifies steam temperature control.

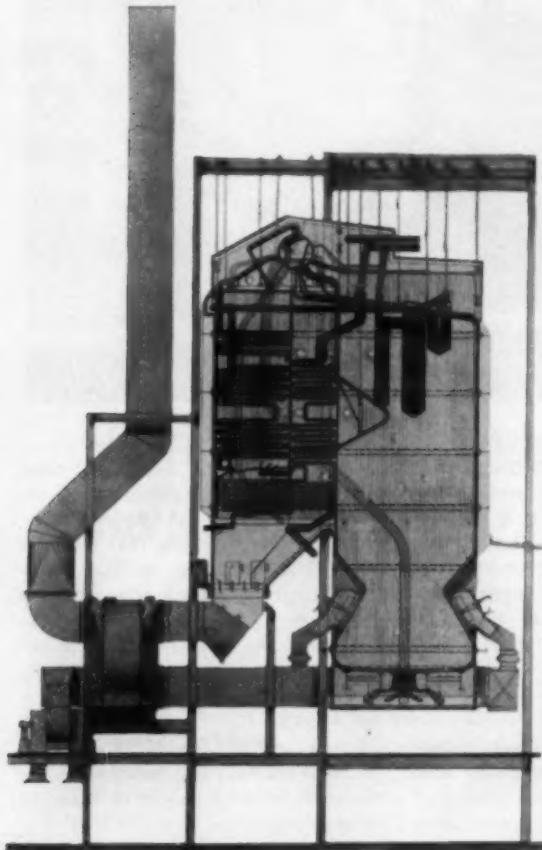


Florida Public Utility — 600,000 lbs/hr
1005/1005F; 1650 psig — Gas and Oil Fired

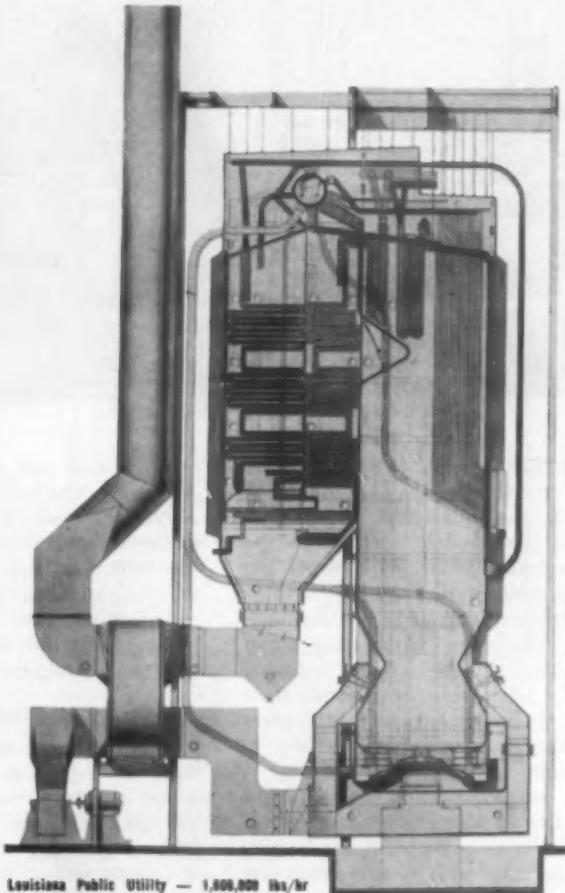
A survey of your plant by a qualified consulting engineer could show ways of making surprising savings in your power costs.

Helps To Lower The Cost Per KWH

- Flyash reinjected into furnace bottom eliminates cost of disposal, recovers combustibles. Quenched granulated slag is saleable.
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- Opposed firing and uniform firing across the entire furnace width remove the limitations on furnace widths inherent in other firing methods.
- One level burner operation results in lower building costs and ease of operation.



Texas Public Utility — 825,000 lbs/hr
1005/1005F; 1750 psig — Gas and Oil Fired



Louisiana Public Utility — 1,000,000 lbs/hr
1005/1005F; 2350 psig — Gas Fired

RILEY STOKER CORPORATION WORCESTER, MASSACHUSETTS

Sales Offices

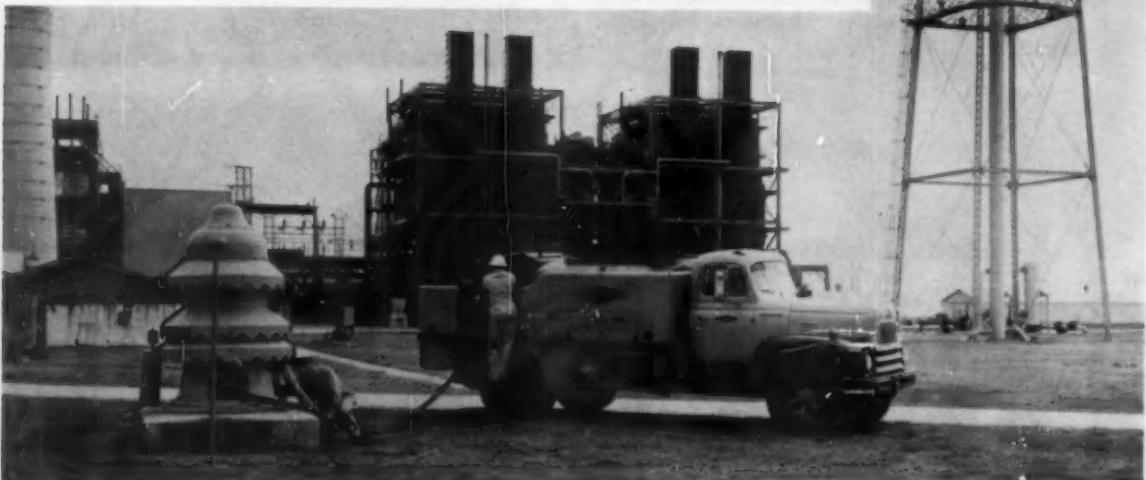
Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston,
Jacksonville, Kansas City, Los Angeles, New Orleans, New
York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San
Francisco, Seattle, St. Louis, St. Paul, Syracuse, Worcester.

 **RILEY**
STEAM GENERATING & FUEL BURNING EQUIPMENT

Stimulating Water Wells

By L. E. WEST

Dowell Division
The Dow Chemical Co.
Houston, Texas



WATER essential to continued production is supplied by wells for many Southern industrial plants. In the past, failing production from plant wells has frequently necessitated drilling additional wells. Fortunately modern methods of stimulating water production from such declining wells often permit increasing their output enough to meet plant needs, thus avoiding the cost of drilling new wells.

Several factors may cause a decline in water production. Scale deposits may accumulate on well equipment and in the producing formation. The area surrounding the screen may become consolidated, hampering flow, or the water table may lower. Water well stimulation treatments effectively combat decreased production resulting from any of these difficulties.

The two major methods of increasing water well production

are acidizing and acid-fracturing. Acidizing consists of injecting inhibited hydrochloric acid to enlarge flow channels in and around the well bore and to remove carbonates, sulfides, and other flow-reducing deposits from the producing formation and from down-hole well equipment.

Acidizing

Acidizing is sometimes performed by pulling the pump and water column from the well and pumping acid into the screen area through a temporary line. After a soaking period, the spent acid is removed by a bailer or pump.

More often, the pump and water column are left in operating position and a "clean-up shot" of acid is pumped into the well to remove readily-soluble deposits from the screen and pump column. The acid is pumped out after it spends. When necessary, additional clean-up shots may be used.

A "formation shot" is then pumped down the column and injected into the producing zone. After the acid reacts, it is pumped from the well. The well is backwashed by pumping water into it following each stage. Multiple backwashing stages are sometimes used at the end of the treatment.

Acid-Fracturing

Acid-fracturing combines the benefits of acidizing with those of fracturing.

Fracturing, originally developed to stimulate production from oil wells, consists of injecting sand-laden fluid into the producing formation under high pressure. The fluid breaks or "fractures" the formation, and the sand-laden fluid flows through the resulting fractures. When fluid injection stops, the sand prevents the formation fractures from completely closing. The resulting artificially-



The only preventive maintenance required on a Vibra-Grate Stoker is for a mechanic to grease it every three months at four points on the front.

AT SPAULDING FIBRE COMPANY
(makers of ARMIT, SPAULDITE fibres and plastics)

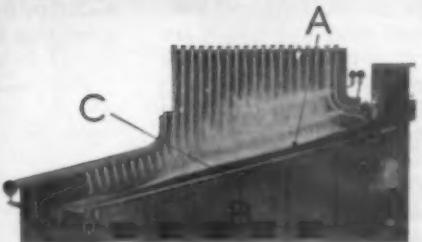
Vibra-Grate Stokers save 1000 tons of coal per year!

The two 50,000-lb AE Vibra-Grate Stokers shown above went on line at the Tonawanda plant of the Spaulding Fibre Company in 1958.

Cost and performance data for the two-year period to January 1960 are reported as follows:

Total coal consumption (both units), 26,472 tons; an estimated savings of 2,000 tons compared with other stokers in the same plant. Superior air zoning increases combustion efficiency at all loads. Average evaporation on one unit is 10.6 lb of steam per pound of coal and 10.8 on the other, using coals having an average Btu value of 13,173.

To cap it off, the company reports maintenance costs are much lower than those of other types of stokers in service, and . . . "efficiency and operating economies far in



With AE Vibra-Grate Stoker, intermittent agitating action feeds coal down inclined grates (A) at controlled rate. This automatically levels fuel, eliminates spotty burning. Separate zones (B) permit exact adjustment of forced draft air for proper combustion at all stages of burning. Water-cooled grates (C) virtually eliminate maintenance. Stoker feeds wet or dry coal of any grade. Water-cooled grates permit burning gas or oil without damage to grates. Quick conversion from oil to coal now possible.

excess of the manufacturer's guarantee and our highest expectations."

In every installation, and under the most critical observation, time and usage are proving the peak efficiency, and the almost total elimination of maintenance costs, possible with the exclusive AE Vibra-Grate Stoker design. No other stoker combines the advantages of vibrating grate feed, water-cooled grates and precision-controlled air zones. Write to Dept. S-103 for copies of plant operating reports and AE Vibra-Grate Stoker Catalog S-546-A today.



AMERICAN ENGINEERING COMPANY
WheatSheaf Lane & Sepviva St. • Philadelphia 37, Pa.

Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P. Q. • Bowden Industries Ltd., Toronto, Ont.

created flow channels are highly permeable and permit water to flow through them readily to the well bore. In fracturing water wells, thickened acid is used as the sand-carrying fluid.

Chemical Additives

Special chemical additives are used when required to meet individual well conditions. Some of the problems which call for the use of additives are corrosion, swelling of silicate materials, precipitation of insoluble compounds from spent acid solutions, and presence of acid-insoluble deposits in the formation.

Corrosion inhibitors are incorporated in the acid solution to control corrosion attack. Such inhibitors retard acid attack on metal well equipment. The inhibitor used must be non-toxic when the water well supplies potable water. The inhibitor must also provide satisfactory protection to the particular metals contacted. Some inhibitors which are used for one type of metal are unsatisfactory for another.

Certain formation silicates swell considerably when contacted by an acid solution. Such swelling can block water flow channels unless proper preventive measures are taken. This difficulty can be minimized by adding a suitable chemical additive to the acid.

Insoluble compounds, principally iron hydroxide, can precipitate from acid solutions. When considerable iron is present in the formation or when substantial iron oxide scale deposits are to be removed from sub-surface well equipment, a large amount of dissolved iron accumulates in the acid.

Unless preventive measures are taken, the iron precipitates from the solution as a reddish, flocculent hydroxide when the acid spends. Stabilizing agents can be added to the acid treating solution to keep the iron in solution, thus avoiding plugging caused by precipitation.

New Technique

Recently, an improved acidizing technique, high-injection-rate acidizing, has been applied to water wells. This new method employs the same type of solvent

used in conventional acidizing, but the solvent is pumped into the formation at high velocity, sometimes as high as 1,000 gpm.

During conventional acidizing treatments, most of the solvent could enter a small percentage of the channels. This new technique forces the solvent to enter channels over the entire producing interval. Another advantage of this method is that the rapid flow through formation channels provides a valuable washing action on the formation itself, combining the benefits of both backwashing and acidizing.

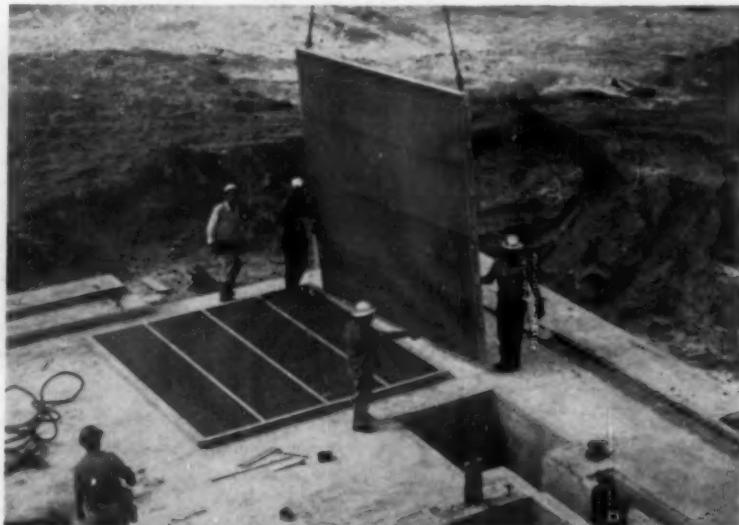
An example of effectiveness of high-injection-rate acidizing is the case of an industrial well in Louisiana which was producing 900 gpm with a specific capacity of 6.92. After the acidizing treatment, the well produced 1471 gpm with a specific capacity of 11.3.

A well belonging to another Southern industrial plant was not producing water at all. Following

a high-injection-rate acidizing treatment, the well produced 1300 gpm with a specific capacity of 21.6. Since the well was returned to service production has increased further. On a later open-discharge test, this well produced more than 2000 gpm.

In addition to increasing a well's production rate, acidizing or acid-fracturing helps wells sustain water-production rates better than similar, untreated wells. Often an old well which has been acidized will have a more favorable decline curve than a new well.

This is illustrated by the case of an industrial plant which had one water well that was eight years old and three water wells which had just been drilled. These wells were located close together. The old well was acidized, while the others were not. Over a 13-month period, production from the old well decreased only 13 gpm, while the other three wells each decreased by an average of 21.3 gpm.



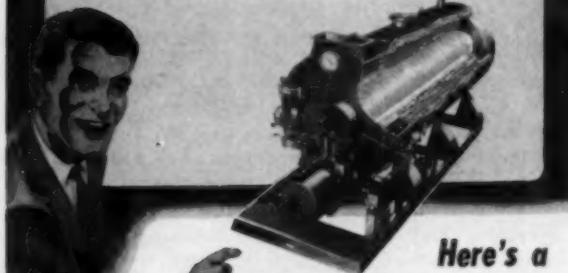
A RECTANGULAR TRASH RACK is lowered into place by workmen at the Indian River Power Plant of the Orlando, Florida, Utilities Commission.

This rack, fabricated from 4-D wrought iron manufactured by A. M. Byers Company, is positioned with the aid of a drag line boom. The trash racks prevent debris from getting into water diversion tunnels and causing damage to operating equipment.

Trash racks were set in vertically. They were fabricated from 4 x 4 x $\frac{1}{2}$ -inch angles and 4 x $\frac{1}{2}$ -inch bars. Wrought iron was specified because of the metal's excellent corrosion resistance in river waters, along with its proven resistance to fatigue and abrasion.

$$h_A = (0.41 + 0.009 \frac{T}{100}) \frac{V_{0.79}}{D \cdot 0.16 \cdot L \cdot 0.05}$$

$$Q = CA \left[\left(\frac{T_1}{100} \right)^4 - \left(\frac{T_2}{100} \right)^4 \right]$$



Here's a
Quick Refresher Course
on Combustion Principles

A Cyclotherm Sound Film-Strip that you and all your engineering friends should see

Every engineer interested in combustion should be sure to see the Cyclotherm sound film-strip, *Heat Transfer and Cyclonic Combustion*. Written by engineers, from a professional, not a promotional, point of view, this film is a quick refresher course in the principles of boiler engineering. *For engineers only* — too many mathematical formulae for the man-in-the-street to follow.

Cyclotherm has also prepared a manufacturing film which shows, step by step, how Cyclotherms are built. Beginning with the flat plate arriving from the steel mills and finishing with the complete boiler shipped to the customer, this film illustrates what we mean when we say that "one manufacturing responsibility is behind the entire equipment."

We'll be glad to arrange for an early showing of both these films. Invite other engineers in your company, as well as members of any engineering group to which you belong. You can see each film in 20 minutes — and you'll find them 20 minutes very well spent. For full information, write us today.

The Cyclotherm manufacturing film almost equals

a trip
through
the
Cyclotherm
plant.



A Division of National-U.S. Radiator Corp. 51 E. First Street, Oswego, N.Y.



MAGNETROL

AS DEPENDABLE AS MAGNETIC FORCE ITSELF

• No matter how specialized the liquid level control application, adapting Magnetrol to meet it presents no problem. Whether it's for high pressures, high temperatures, corrosive liquids or any other condition, a few "standard" modifications and the job is done! Operation is so simple no changes in basic design are needed. That's why Magnetrol "fits" practically any application — why "specials" are so often standard with us.

Because of the utter simplicity and dependability of its magnetic principle, Magnetrol has infinite operating life. There are no wearing parts to get out of order.

Magnetrols are available for controlling level changes from .0025-in. to 150-ft., with single or multi-stage switching. Our experienced engineering staff is at your service.

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WHY NOT MAIL THE COUPON — NOW

Zone _____	State _____
Magnetrol, Inc., 2118 S. Marshall Blvd., Chicago 23, Illinois	
Please send me catalog data and full information on	
Magnetrol Liquid Level Controls.	
Name _____	City _____
Company _____	Address _____

New Plant Makes Five Products

A HIGHLY VERSATILE low temperature plant at Johnsonville, Tenn. is now making 60 million cubic feet of oxygen monthly, along with four other cryogenic products. The \$3,000,000 facility was designed, built and is owned and operated by Air Products, Inc. of Allentown, Penna. to supply a large chemical process plant in the Johnsonville area.

Low Temperature

The plant employs a special low temperature process called the "split cycle," originally developed by Air Products to permit the

economical production of both gaseous and liquid oxygen and nitrogen at the same time.

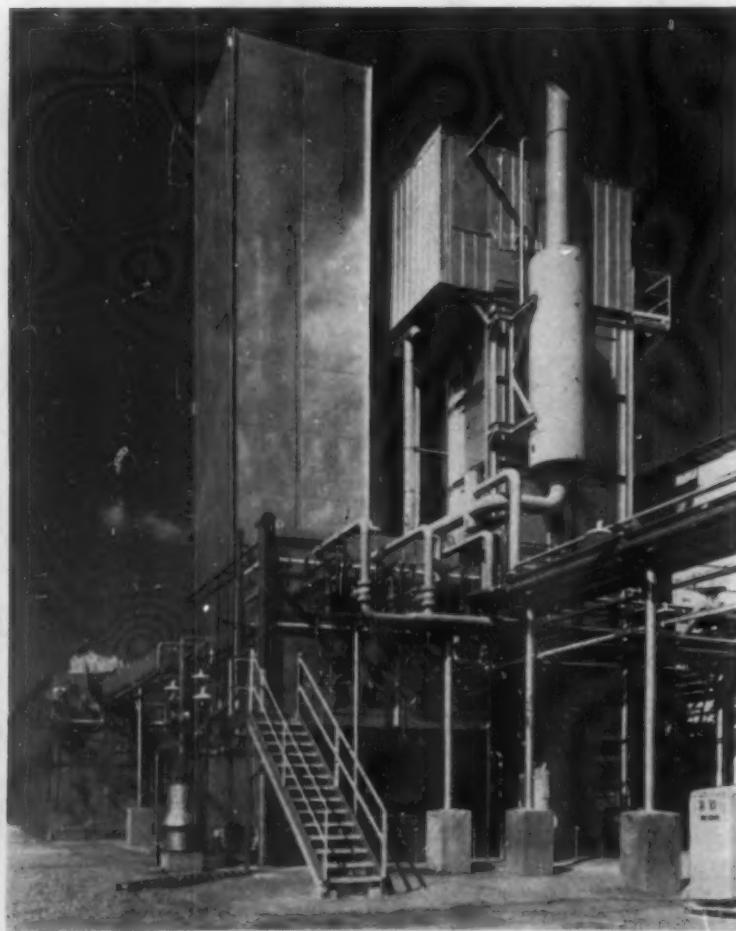
The Johnsonville plant simultaneously produces tonnage quantities of gaseous oxygen, 99.95% pure nitrogen and purge gas, all available at line pressure, and liquid oxygen and liquid nitrogen for storage. One of the chief advantages of the design of this plant is the flexibility of its product mix. Whenever demand for gas is low, liquid production for storage can be stepped up, and vice versa.

On-site liquid storage eliminates the need to rely upon hauled-in

oxygen and nitrogen when the plant is shut down for defrost or maintenance. Large volumes of these gases can be stored most economically in the liquid state at ultra low temperatures (-320 F) for stand-by use.

When it is necessary to supply oxygen or nitrogen from storage, the liquid is pumped to required pressure and then warmed up to its gaseous state by a steam-heated vaporizer. The storage system holds the liquid equivalent of 3,000,000 cubic feet of oxygen and 2,800,000 cubic feet of nitrogen, or roughly two days of the plant's gaseous production capacity.

On-site production of industrial gases for major industries is a concept pioneered by Air Products. It makes tonnage quantities of these gases economically available for many new chemical processes and techniques, and is a key factor in the expansion of steel production throughout the country.



This new low temperature plant produces gases on-the-site for a large chemical complex at Johnsonville, Tenn. Liquid storage facilities are housed in building at left. The two high structures in center contain distillation and heat exchange equipment. Compressors and master control panel are in building at right.

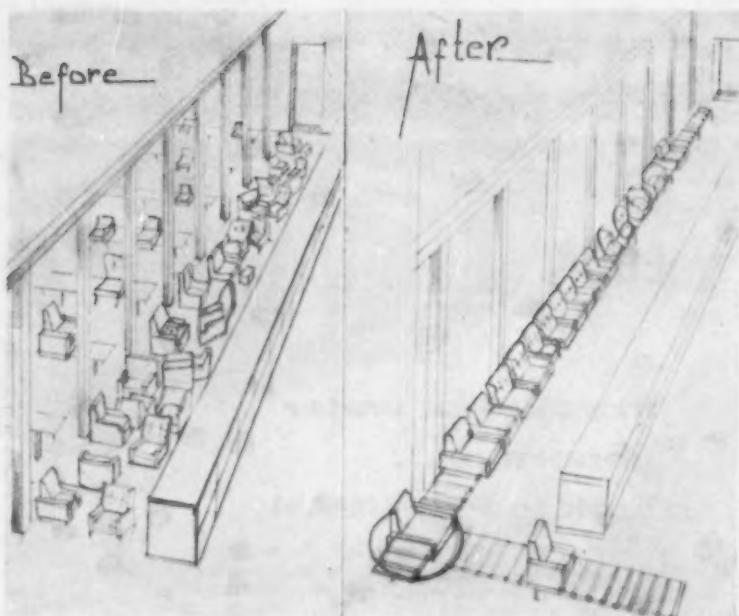
Production Line Straightened Out

THESE SKETCHES of a before and after nature show how a simple feature improved production, reduced the number of man-hours required, reduced damage to the finished product and resulted in efficient over-all operation in a furniture factory in Lincolnton, North Carolina.

The before sketch shows how furniture was assembled, inspected and handled prior to the new system which was installed at the Burris Manufacturing Company.

Burris finished products are expensive and damage can easily be incurred to the fabrics through soiling, tearing, etc. Some of the fabrics cost seven or eight dollars per yard so it can be seen that damage to this type of finished product can easily become a costly item in its manufacture.

In the consideration of this problem a number of schemes were evaluated and finally we decided to install a simple roller conveyor placing each item on a 3×3 plywood sheet $\frac{1}{2}$ inch thick. This type of material is not readily adapted to roller conveyors and we found that it was necessary to use the



plywood base which would rest upon the rollers.

The conveyor is 85 feet long and is set up beside the production lines. The furniture moves on these rollers, which are not automatic, until it reaches a turntable.

Here it is inspected and transferred to a similar conveyor where it travels to the Shipping Department for final inspection and packing.

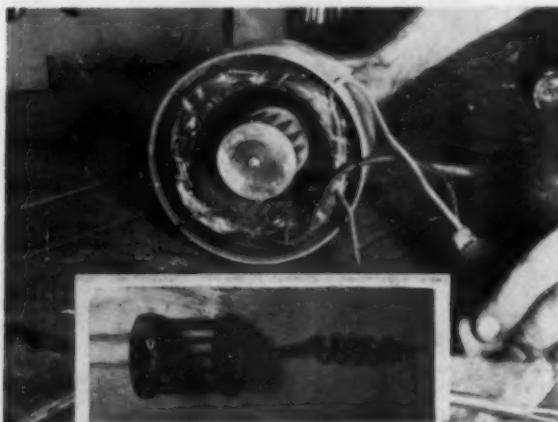
It is amazing how a simple improvement such as this can enable each man to produce more finished

work, lessen the fatigue factor for each workman, and provide a smooth and even flow of production.

In the first month we made a savings of 58 man-hours and an estimate of the reduction in damage to the finished product is in the neighborhood of several hundred dollars each month.

By HARRY B. SULLIVAN, Division Superintendent, Burris Manufacturing Co., Lincolnton, N. C.

Motor Rotation Indicator



A SIMPLE squirrel cage rotor, poked inside the stator of a rewound motor, tells in advance of the motor's assembly what its direction of rotation will be.

The cage is free-wheeling on a shaft which is a projection of a twisted wire handle, and is held onto the shaft with a nut, where the shaft projects through the furthest disc. End discs are copper, as are the No. 9 wire rods brazed into the discs at intervals of a half-inch around the periphery of the discs. This indicator is simply made and saves shop time. It also tells if any faults exist in the finished winding. In case of an open or short, it won't revolve. To use, place the rotor inside the stator, and shoot the juice momentarily to the winding.

By H. J. MILLER, Sarasota, Fla.



LOOK FOR QUALITY

in your hot water
generator...
look to FINNIGAN

Finnigan Hot Water Generators are engineered to give you large quantities of hot water for low operating cost. The finest materials, creative skill and quality construction assure efficiency in Finnigan equipment. These generators are fabricated from corrosive-resistant materials and contain copper removable-coil heating elements. Before leaving the plant, each generator must conform to ASME, API, U. S. Government and other specifications. "Fabricated by Finnigan" is your assurance of quality. Finnigan builds hot water generators to your specifications. Call, wire or write today for complete information with no obligation to you.

TANKS, SMOKESTACKS, PIPING, WATER HEATERS, BREECHING, PLATE WORK.



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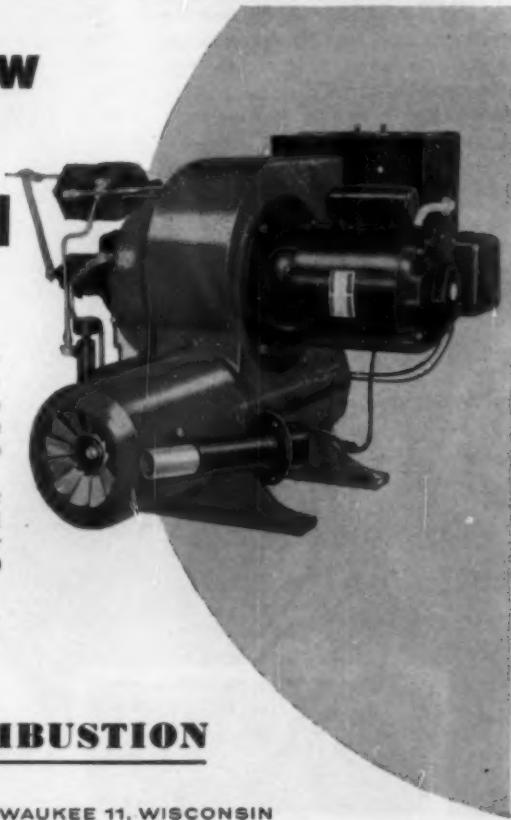
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Birmingham 5, Alabama, 1107 Seventh Ave., South
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Keep heating costs low with HEV-E-OIL commercial-industrial burners

Hev-E-Oil burners furnish all the air necessary for combustion, assuring perfect fire control under all weather conditions. Low fire start that builds up gradually to the flame size required means smooth, safe operation. And once the burner is set for greatest efficiency, it stays that way no matter what the weather.

A complete package! Fire tested! Automatic, electronic controls. Meets all codes. Easy to install . . . Hev-E-Oil models from 5 to 150 gph. Also available, Hev-E-Duty power gas burners and combination gas/oil burners from 720,000 to 21,000,000 B.T.U.

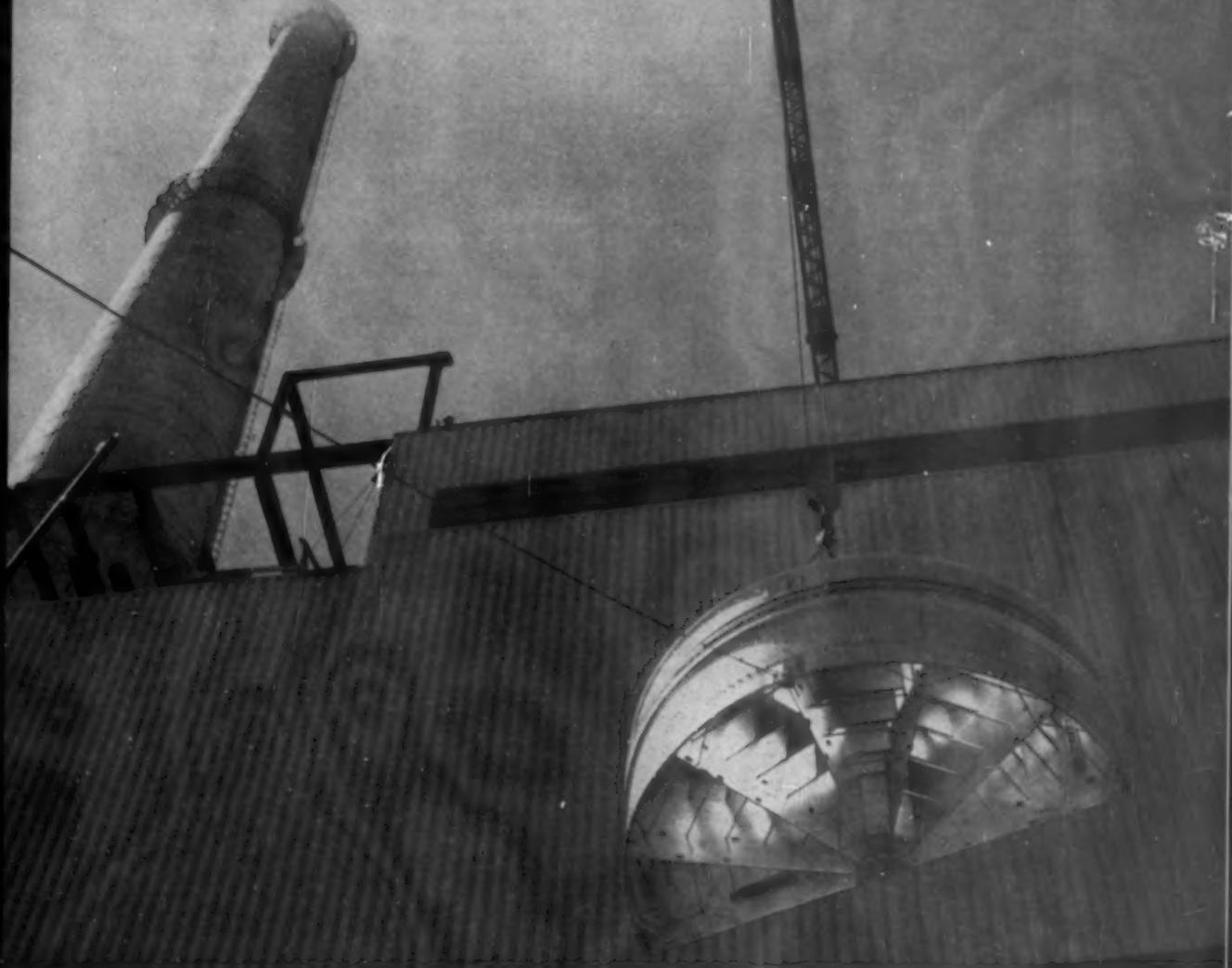
For more information write Industrial Combustion, Inc., 4507 N. Oakland Ave., Milwaukee 11, Wis., Dept. SPI-1259.



INDUSTRIAL  **COMBUSTION**
INC.

EXECUTIVE OFFICE: 4507 N. OAKLAND AVE., MILWAUKEE 11, WISCONSIN

Ljungstrom rotor half is hoisted into place at Public Service Co. of Indiana's 600,000 KW generating station at New Albany, Indiana. When complete, baskets filling the chambers inside the rotors will provide approximately 1,500,000 sq ft of heat-exchange surface. This is one of the eight Ljungstroms being installed to serve four boilers, each evaporating 1,000,000 lbs of steam per hr. The New Albany station is scheduled for completion in 1961.



BEHIND NEW ALBANY'S LJUNGSTROMS® —LIFETIME AIR PREHEATER SERVICE

One of the major reasons why Public Service Co. of Indiana, Inc., chose Ljungstrom for its new generating station at New Albany is Lifetime Air Preheater Service.

Lifetime Air Preheater Service means that Ljungstrom engineers make regular calls *throughout the life of each unit*. They check to make sure your Ljungstroms are working at top efficiency, and that they'll continue to work that way. This service policy covers all Ljungstroms—right from the very first installation made in 1923.

But that's not all. Air Preheater provides first-rate *emergency* service, too. For instance, a Ljungstrom customer in the southwestern U.S. recently called on a Wednesday night for replacement parts. Air Transport looked like the fastest way, but schedules indicated a minimum three-day delivery time. So Air Preheater loaded the parts on a pickup truck, and their men drove them more than 1,000 miles to their destination...34 hours straight driving. The parts were installed and in service by Friday morning.

Fast response to emergencies and regular inspection of Ljungstrom installations are two of the many advantages Air Preheater provides. Another is expert knowledge of boiler and preheater problems gained from over 35 years' experience. Perhaps these reasons explain why 9 out of 10 preheaters sold today are Ljungstroms.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

\$5,000 Saved for Texas Plant

THIS JOB was unique and required versatile tooling.

The job involved machining lens joints in the faces of ten high pressure flanges that were welded on 6" double extra heavy pipe and were fabricated in the shape of a cross and Y-shaped. The original machining of the flanges was done before they were welded on the pipes. The lens joints were damaged in shipment to our plant.

A lens joint is a seat that is machined in the face of a flange, on a true radius and a corresponding ring is installed between flanges on installation to hold at a high pressure. The joints had to be perfect.

If it had not been for versatile tooling in our shop, the flanges would have had to be removed from the pipe and machined in a lathe. This would have involved more machine work in preparing for welds, the weld's stress relieved and x-rayed after being made. The cost would have been near \$5,000.00.

We machined these flanges without removing them from the pipe on our 3 Horizontal Boring and Milling machine by setting the pipe on the table on V-Blocks, with the flange to be machined true with the machine spindle. We used a special boring head mounted in the spindle, that is designed to bore true radii and also to bore taper. This set up worked perfectly and the job was done without a schedule delay and at a cost of \$12.00 per flange.

By W. O. SMITH, Machine Shop
A, The Dow Chemical Company,
Freeport, Tex.

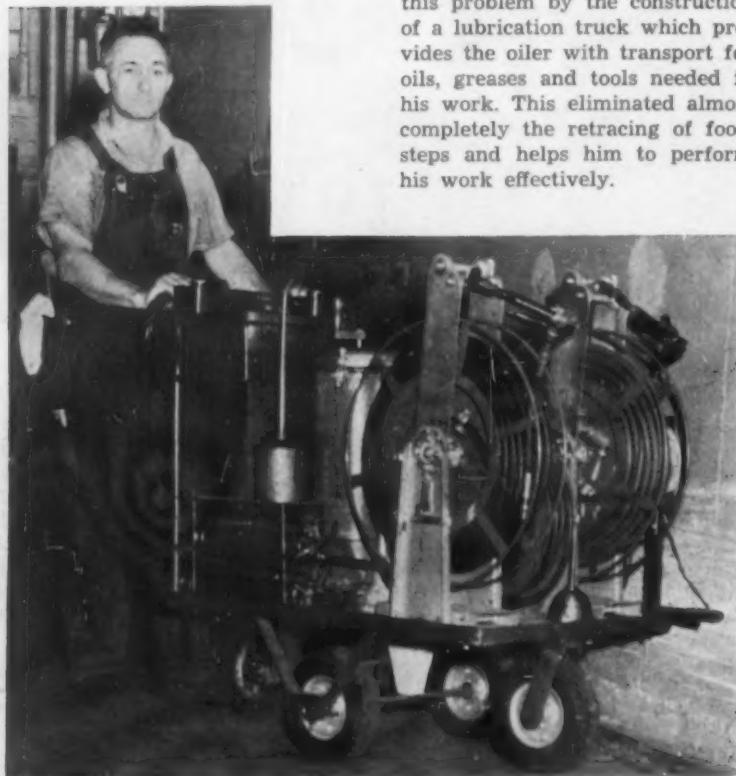
Lubrication Truck

North Carolina

IS LUBRICATION a problem at your plant? It has been, until recently, a big problem at North Carolina Finishing Company for many years. They have a long narrow plant and the two lubrication men spent a large part of their time going back and forth

to their supply point to obtain the correct grease or oil to do the job. The lubrication men could carry only 1 or 2 greases or oils at a time. Basically, about 5 or 6 oils and greases are used and overall there are 12 different types of oils and greases.

A big step was made in solving this problem by the construction of a lubrication truck which provides the oiler with transport for oils, greases and tools needed in his work. This eliminated almost completely the retracing of footsteps and helps him to perform his work effectively.

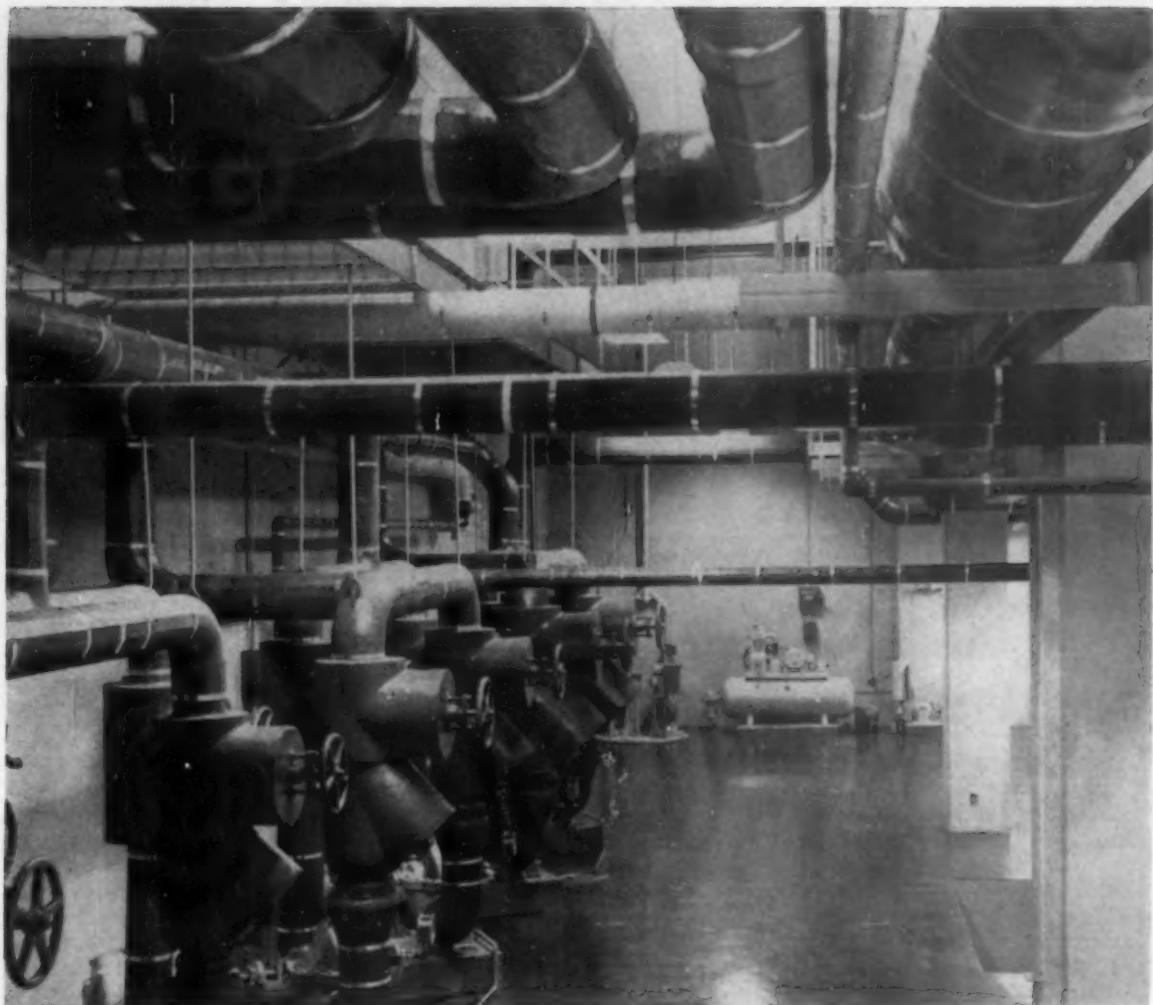


The truck, built by machine shop personnel, measures 26" by 42" and is easily pushed and navigated in small aisles. The frame is of steel with a plywood platform. Front and rear wheels are swivel mounted and the pneumatic tires are an aid to easy pushing. Brakes lock the wheels when the truck is at a work position.

There are two electric powered high pressure lubricators mounted on the truck. Each lubricator has a spring return hose reel carrying 40 ft of hose. Another spring return reel with 50 ft of electric cord powers 2 grease guns. This enables the oiler to use either grease gun from the same plug-in. A common ground for the complete unit provides a safety feature that is needed while oiling and greasing around 550 volt current.

A shelf is provided for storing cans of the various oils. Special racks and brackets are provided for hand grease guns, oil cans and funnels. A tool box complete with lock is located over the shelf. Yes, there is even a small desk where the oiler keeps his work order pad and pencil.

The cost of the truck and equipment was less than \$500 and has enabled the North Carolina Finishing Company to reduce the number of oilers from 2 to 1, a good savings for a minimum of effort.



Sure it's neat—but how can you tell it's safe?

The product tells you it's safe—USS National Seamless Steel Pipe and Tubes. The designer who insists on USS National Seamless is taking no chances. He wants to safeguard life and equipment, and to stop shutdowns because of unexpected failures.

Seamless shuts out all doubt. From end to end, it's one continuous piece of highest quality steel. No welds. No weaknesses. Absolute uniform wall strength. What's more, when a solid billet of steel is pierced, it's also critically explored. If the billet is successfully pierced, then every inch of the pipe is structurally sound.

Little wonder, then, that for industrial uses involving particularly severe or hazardous service, the first choice of engineers is seamless—in many cases, the use of seamless pipe is mandatory.

Remember this! USS National Seamless has ample ductility to permit bending, coiling and all other manipulations. USS National Seamless is not

only the safest, but also the easiest to work with.

National Tube manufactures seamless pipe and tubes in a complete range of steel analyses from low carbon through the alloys up to and including stainless steel, to withstand the highest pressures and temperatures. A wide variety of sizes and wall thicknesses is available. Plan now to contact National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

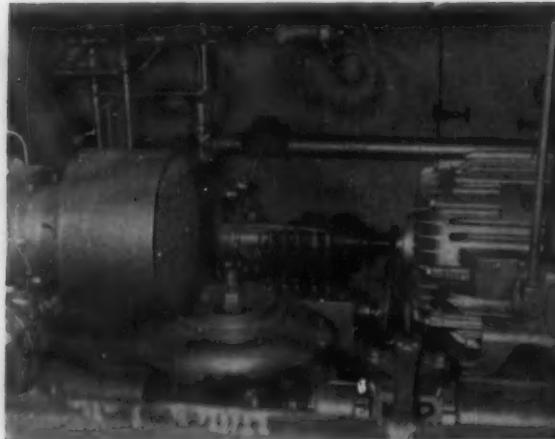
USS and *National* are registered trademarks

The world's largest and most experienced manufacturer of tubular products

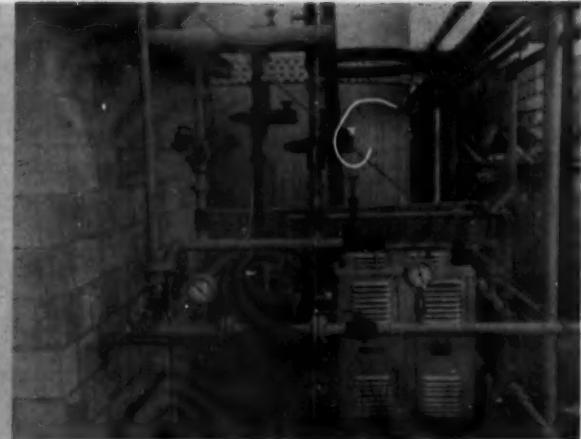


**National Tube
Division of
United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York
United States Steel Supply Division



Compressor, mixing valve, and electrical controls are located in a house provided for the purpose.



Propane gasifiers and pressure reducers and indicators are located adjacent to the control house.

Gas Diluter System Solves Problem for Textile Mill

A GAS DILUTER system has provided an advantage in use at one large textile finishing plant. The system enables the plant to use one set of burners and one set of orifices for both natural gas and standby propane fuel. The fuel is used for singeing, curing, drying, and other processing operations.

Using a mixing valve and an air compressor, the valve acts as a governor set at atmospheric pressure and is normally in non-operative position. Propane gas from the storage tank goes to the gasifier and is regulated to eight-inch water column. It then goes through an electric safety valve to the governor, and then to the

Constamix valve which mixes correct air-gas ratio. The compressor puts negative pressure on the inlet side of the valve and pulls correct mix through and into service lines at operating pressure.

When the compressor builds to 35 pounds pressure, a regulator valve by-passes back to the compressor inlet line. This is a safety measure and is necessary to keep constant line pressure regardless of the volume of gas used.

This plant originally ran on propane gas. Natural gas became available and is now used because of the cost advantage. The natural gas is used on demand rate (preferred cutoff); wherein, any

amount may be used until the gas company needs to cut the supply due to other demands. During cut-off periods, propane is used in the plant as stand-by.

The diluter system eliminates the need to change orifices in all burners every time stand-by gas is used, and a major operational nuisance is thereby eliminated.

The only trouble experienced in making the installation came with a decision to put the controls in a house. This necessitated the substitution of Class I, Group D controls; whereas, open type switches and controls were received initially, and these had to be returned for the change. Also, a regulator already on hand was installed in lieu of prescribed equipment. This substitution caused trouble, did not work, and the correct valve had to be ordered anyway.

An Air Tight Case

"MATERIAL furnished must hold bore vacuum tight when evacuated to one micron pressure." So reads the requirement by the Atomic Energy Commission for parts of certain equipment used in nuclear diffusion. Material to be aluminum bronze.

Normally a designer would think first of the forging process to give

the compact structure which would be necessary to hold such a high degree of vacuum. However, investigation proved that the quantity of parts involved was too small to amortize metal die charges and still retain a competitive price.

The problem for this Southern Manufacturer was solved by Ampco Metal, Inc., Southwest Division located in Garland, Texas. The answer was centrifugal castings supplied in Ampco Metal Grade 16, a very high strength small grain

structured aluminum bronze.

Centrifugal casting involves the pouring of molten metal into a relatively inexpensive carbon die spinning at a high rate of revolutions per minute. The force resulting from rotation gives an effect which might be likened to liquid forging in that the molten metal is compressed against the outer periphery of the die chamber by a pressure equal to several hundred "g's." A very dense metallurgical structure results from this process.

How to beat the high cost of temperature control

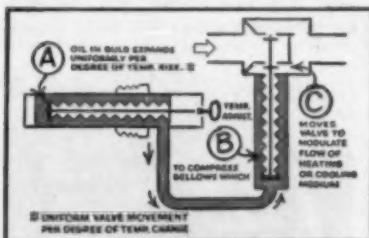
The practical approach to temperature control

By John W. Ritter, Test Engineer,
SARCO Company, Inc.

Precise temperature regulation is essential in many processing operations, not only for quality control, but for maintenance of output as well.

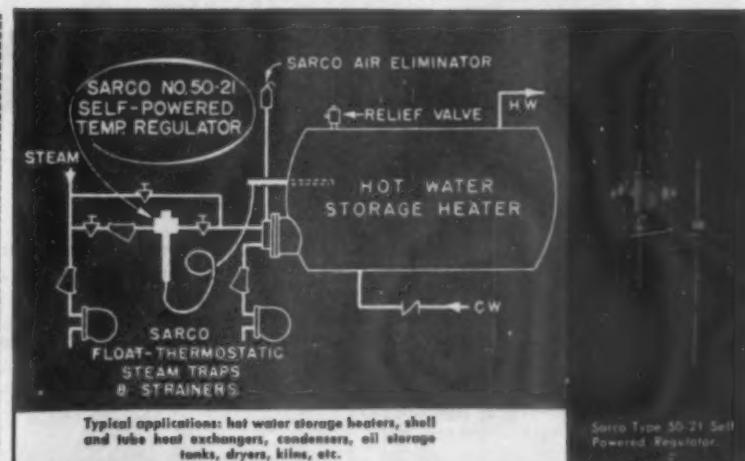
Manual temperature control is unsatisfactory because of the possibility of spoilage and loss of quality control which can result from irregular or indifferent hand regulation.

Automatic controls are available in a wide variety, including pneumatic, electronic, and self-powered. Pneumatic and electronic controls are relatively expensive to purchase and install, and may require frequent maintenance. However, in most applications, control requirements can be achieved very successfully by the use of relatively simple, economical Sarco Self-powered Regulators.



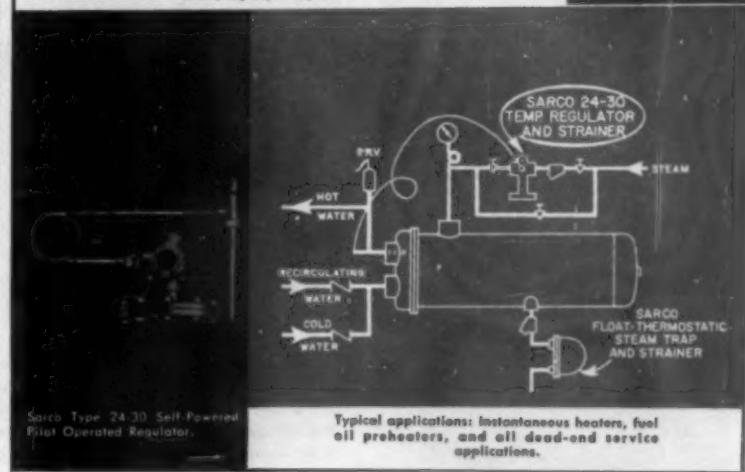
This drawing shows simplicity of operation of the Sarco 50-21 Temperature Regulator, which consists of a thermostat, capillary tubing, and a valve.

Sarco controls, like the 50-21 and the 24-30, have the required degree of sensitivity and dependability, combined with the ruggedness inherent in the sealed capillary tube construction. Because these Sarco controls do not depend on external power, such as electricity or compressed air, they have established long records of sustained, reliable operation. They are an economical and practical solution to the problem of maintaining continuous watchdog duty over processing temperatures.



Typical applications: hot water storage heaters, shell and tube heat exchangers, condensers, oil storage tanks, dryers, kilns, etc.

Sarco Type 50-21 Self-powered Regulator.



Typical applications: instantaneous heaters, fuel oil preheaters, and oil dead-end service applications.

Self-powered automatic temperature regulators by SARCO . . .

have these 5 marked advantages: No compressed air or electrical wiring required. No delicate mechanisms to adjust or maintain. No packing glands to stick or require maintenance. No shutdown during power failure. No specialized maintenance required.

Sarco Self-Powered Controls are self-contained and can be installed by any pipe fitter. They are so reasonable in cost that you can afford Sarco automatic heating controls for every application in your plant. Write for 10-page Sarco Control Bulletin No. 620.

6346-B

SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES



NEW Product Briefs

... there is always a BETTER WAY

Wet Dust Collector

L-1 A new concept of hydrostatic dust collection, the Mist-O-Miser Dustraxtor, introduced by the **Fly Ash Arrestor Corporation**, Birmingham, Alabama, employs a circular venturi introducing a mixture of dirty gas and water mist into a vertical cylinder. The cylinder permits a longer retention period of the dusty air in the cleaning element thus increasing the probability of water and dust particle collision. The water is removed from the air stream by a circular baffle which is in itself an



excellent dust impingement surface. By venturi variations this new collector can meet any wet collection application. This collector also introduces a new first in the handling of floating material which is normally an impossibility for most wet collectors.

Dust disposal arrangements include: flat bottom hoppers for manual cleaning; triangular hoppers for continuous flushing; chain and paddle scrapers for flat hopper sludge removal; and separate settling hoppers with any of the previous mentioned arrangements.

Packaged Boilers

L-2 The **Cleaver-Brooks Company**, 326 East Keefe Ave., Milwaukee 12, Wis. has announced an extension of its C-B packaged fire tube boilers to include three new units in the 400, 500 and 600 hp sizes.



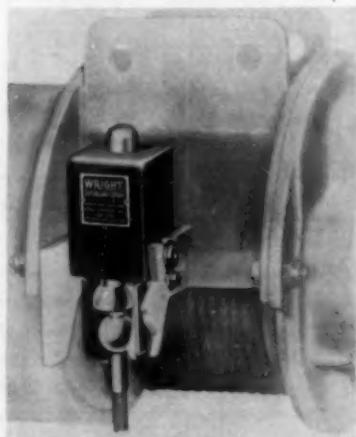
The new units are ideally suited for heating and processing steam or hot water for larger type commercial, industrial and institutional applications such as schools, hospitals, hotels, office buildings, factories and shopping centers.

C-B boilers are now available in a range from 15 to 600 hp with 18 sizes in 90 models. They are available for high or low pressure steam and can be fired with oil, gas or combination oil/gas.

L-3 Model 1107 Adjust-O-Feeder provides low-cost injection of boiler treatment chemicals in boilers and is ideal for treating make-up water, or for constant feeding at low rate. In addition, it is suitable for the correct proportioning of chemicals in the water and sewage works, chemical and food industries, etc.

Electric Hoist Overload Protection

L-4 Fast - acting mechanical overload protection for the operator, load and the hoist itself, is now available for the first time on any type of electric hoist. Designed and built to fit any Wright Speedway Electric Hoist, the new Overload Cutoff unit, which is an integral part of the hoist frame,



Proportioning Pump

L-3 A new, plunger - type, small capacity proportioning pump for chemical treating of small, low pressure boilers has been introduced by Proportioneers, a division of **B-I-F Industries, Inc.** 345 Harris Ave., Providence, Rhode Island, manufacturers of process instrumentation, equipment and systems for positive control of materials in motion.

has been introduced by the **Wright Hoist Division**, American Chain & Cable Company, Inc., York, Pa.

Calibrated and sealed at the factory for the user's protection, the unit can take rugged abuse up to the critical point of overload; then it instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is performed, the raising circuit is automatically restored.

Bronze Gate Valve

A completely redesigned and greatly improved Bronze Quick-Opening Handy Gate Valve, designated as Fig. 430-58, has been announced by the Lunkenheimer Co. of Cincinnati 14, Ohio.

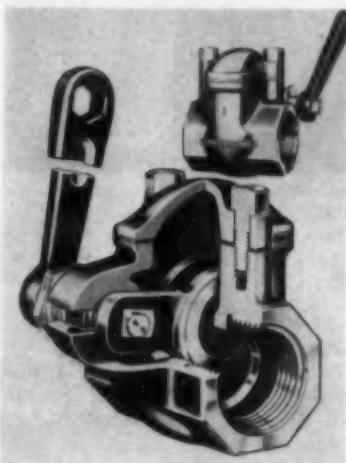


Fig. 430-58 provides tight shut-off against flow from either direction; yet, affords quick and easy operation. The valve features a ball-and-socket joint between self-adjusting disc faces, and accurate guiding, which assures flexibility for pressure-tight seating. A deep stuffing box effectively seals the operating stem while permitting easy operation. Available in sizes $\frac{1}{4}$ -inch through 4-inch, the valves are rated 75-lb steam pressure for water, oil, gas. They are especially recommended for installations where quick operation is required to handle water, oil and low pressure steams.

Control Line

L-6 Unitized construction is a key design feature in the new line of 0-4 contactors, manufactured by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. A full range of standard, special-design and accessory control devices are available in these sizes for applications from 110 to 600 volts for fractional to 200 hp motors.

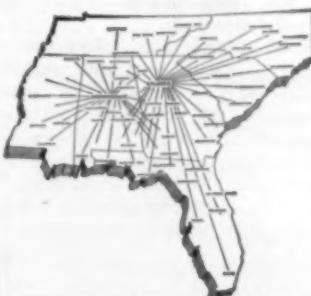
Beginning with the contact block and magnet coils, A-C in the new control line has developed a simplified starter line with many standardized parts in all sizes. The glass-filled, molded contact block offers

3 Steps to *QUICK* steel

- 1 CHECK YOUR NEEDS
- 2 CALL ATLANTIC STEEL
- 3 OPEN YOUR DOOR

STEEL WAREHOUSE SERVICE You Can Always Count On

24 HOUR SERVICE
ANYWHERE
IN THE
SOUTH



The minute your order is received, it is on its way to being filled and shipped. One of the South's largest and widest varieties of steel warehouse products, plus a willing organization coupled with the most modern facilities, makes this possible. So when you want steel or aluminum, and need it in a hurry, call Atlantic.



"Service in Step With Southern Progress"

WAREHOUSE DIVISION

Atlantic Steel Company

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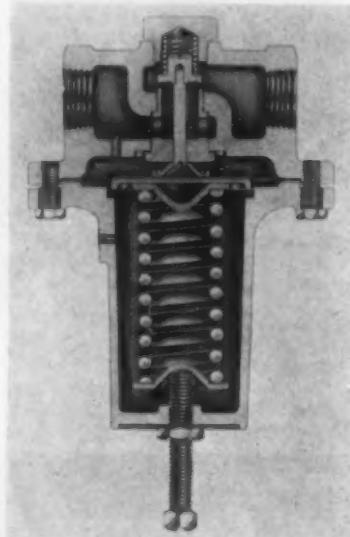
high resistance to arching and mechanical shock damage. The molding material is practically impervious to moisture and fungus. Silver-cadmium oxide contacts minimize erosion. They can be inspected by removing the starter cover and two screws. Contacts can be replaced without removing any wires.

Standard equipment includes molded epoxy magnet coils available in either 110/220 or 220/440 volt sizes. Conversion from one voltage to another is facilitated by a clip arrangement or by wire connections to the magnet coil terminal block.

Overload relays are 100 per cent trip-free for accurate, reliable motor protection. They can be reset manually or automatically. Connection for automatic reset is made by a simple external adjustment on the side of the relay. Front mounting design provides for easy inspection. Also available is a complete line of heater elements for standard and fast-trip ratings.

Direct Operated Reducing Valve

L-7 A new direct operated reducing valve, designed for both steam and air service, has been developed by Mason-Neilan, Nahatoss St., Norwood, Mass.

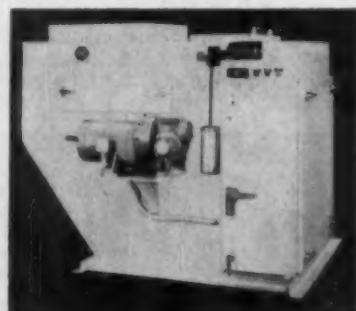


Designated No. 17-1, this new regulating valve provides accurate control of steam pressures for a wide variety of plant applications. It features accurately sized and lo-

cated ports to minimize fall off; isolated diaphragm chamber for maximum stability; large body passages; and lapped seating surfaces for tight shut-off. A variation, No. 17-22, is made with a special soft seat for air service.

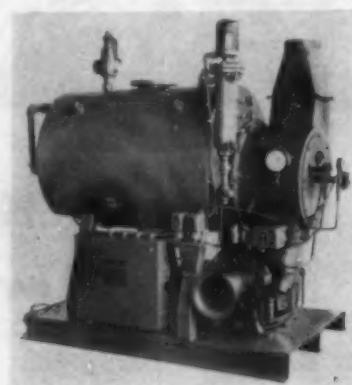
Specifications include sizes of $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" in iron construction; and reduced pressure ranges of 2-12; 8-50; and 25-150 psi.

automatic operation, is available from Beaumont Birch Co., 1505 Race Street, Philadelphia 2, Pa.



Steam Generator

L-8 The Vapormatic Coil-N-Steam Generator is now offered by Texsteam Corp., 320 Hughes St., Houston 11, Tex. for processing, cleaning, heating and other applications.



The steam generator is completely automatic and all sizes have modulating controls as standard equipment. They are available with gas, oil and combination gas-oil fuel burning systems.

It is a forced circulation, water tube type steam generator, employing an advanced method of steam generation. All component parts are integrally mounted on a common base, requiring only feedwater, fuel, steam and electrical connections to put it in service. It generates steam from a cold start in ten minutes.

Belt Fed Scale

L-9 A Belt Fed Weigh Scale, which automatically weighs and records 15 tph of coal or other bulk materials weighing 50 pounds per cubic foot while providing a continuous record of consumption that is accurate to 0.25%, and which may be instantaneously set to by-pass the feed chute or to resume

The scale has a dust tight enclosure with a $24\frac{1}{2}$ square inlet, and a 200 lb hopper capacity; feed chutes, skirt plates, the regulating plate and hopper are of stainless steel to prevent corrosion. In the event of a power failure, the coal can be bypassed instantly from the feed chute to a gravity discharge opening, without moving or breaking the belt feeder.

Air Atomizing Packaged Boilers

L-10 New design features of Model AA Air Atomizing Amesteam Packaged Steam Generators include revolutionary oil and gas burner improvements, low-



er first cost, greater compactness for easier installation, more centrally-located simplified controls, increased operating and maintenance economies.

Introduced by Ames Iron Works, Inc., Oswego, N. Y., the Model AA offers an advanced design low pressure, air atomizing oil burner and

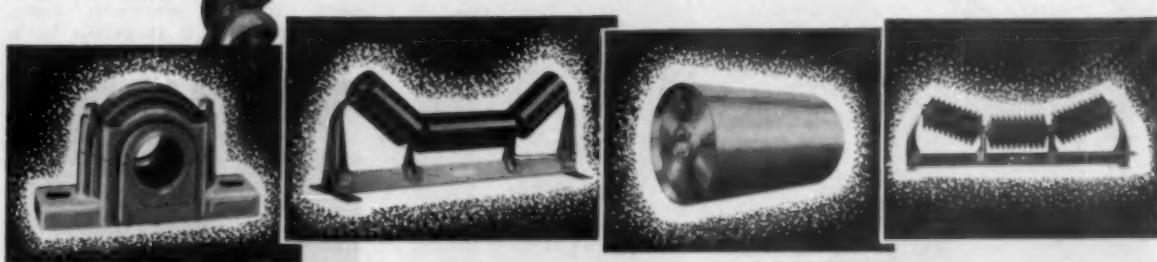
(Continued on Page 74)



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copy of the new 88-page Continental Belt Conveyor Data Book showing products and installations, and giving specifications in diagrams, charts and tables — all in simple, easy-to-understand form. Ask for Engineering Data Book ID-591.

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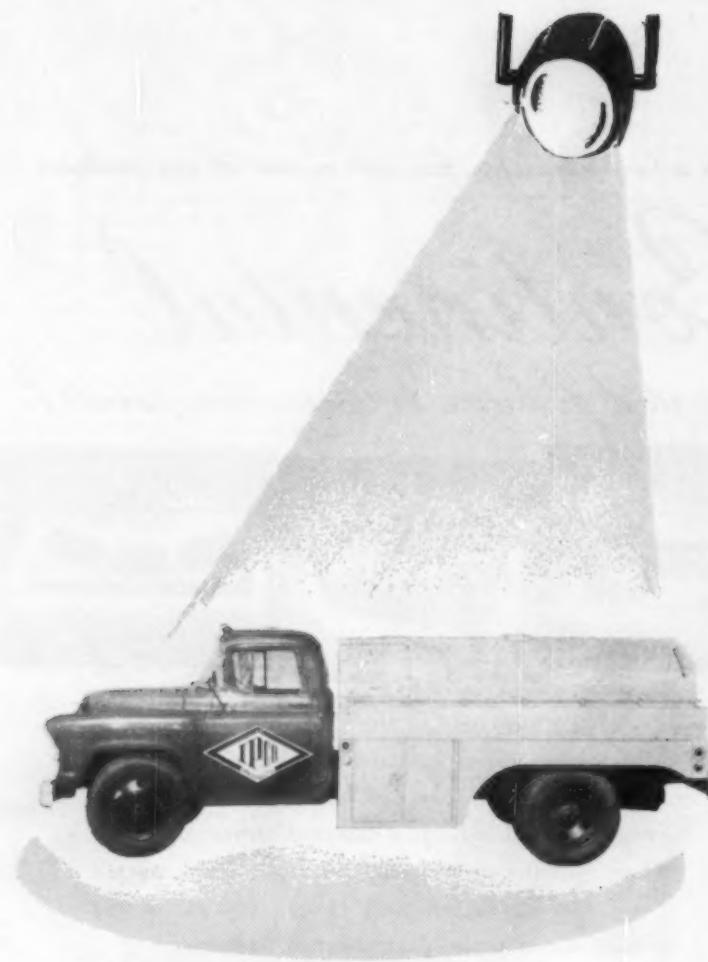


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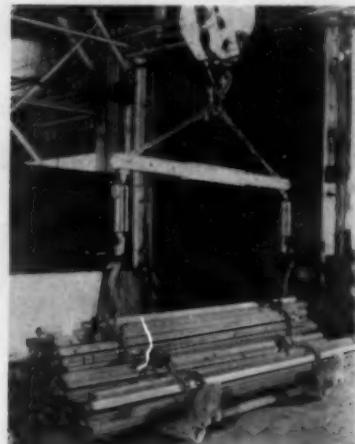
IPCO LABORATORIES, Inc.
 FORMERLY INDUSTRIAL PRODUCTS CO.
 2710 APPLE VALLEY ROAD, N. E.
 ATLANTA 19, GEORGIA

(Continued from Page 72)

an all-new ring type gas burner. The new burners provide stable, uniform flame patterns, and cleanly burn all grades of oil or gas at extremely low noise levels, over a modulating range of 5 to 1.

Solenoid Chain Release

L-11 The Acco Solenoid Chain Release has been introduced to provide extreme safety in those operations where conditions make it dangerous for a



worker to unhook the load. Permitting the safe release of those tough-to-handle loads without assistance, the unit is manufactured by the **American Chain Division**, American Chain & Cable Company, Inc., York, Pa.

The unit is remote-controlled by the crane operator from his cab. By pushing a button, he activates the solenoids at each end of a spreader bar. This, in turn, expels the chain from its hooks and releases the load. Should the push button be pressed accidentally, or the power fail while the load is being transported, the load will not be released.

Conveyor Belting

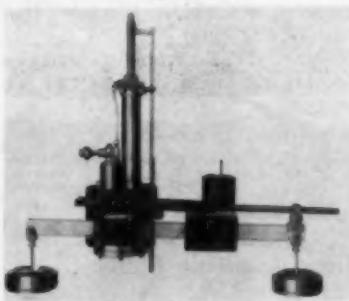
L-12 **United States Rubber Co., Mechanical Goods Division**, Passaic, N. J., is manufacturing a new friction surface conveyor belting known as In-destructible Slab. Available in three or four-ply constructions, the new

belting is bright orange in color. It has a non-staining surface that is resistant to mild acids such as those in citrus fruits.

Because of its supple natural rubber construction, the belting can easily flex around the small pulleys which are standard on package conveyors. It can also be used for slider bed service where the belt operates over hard wood or metal surfaces, or as a drive belt on live roller conveyors. It is available in widths from four to 48 inches.

Damper Regulator

L-13 A new damper regulator which also regulates fans, stokers, oil and gas control valves and is suitable for use on any boiler that operates at pressures from



5 to 150 psi, is available from **Atlas Valve Company**, 280 South Street, Newark, New Jersey. The device may be used to actuate lever-operated balanced valves for pressure regulating service, either reducing or unloading.

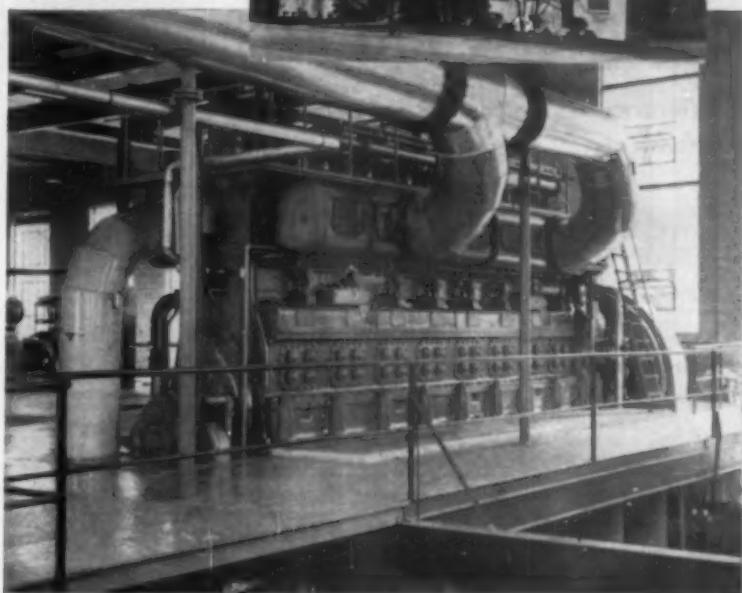
The **Atlas** No. 5000 hydraulic damper regulator repositions dampers and lever-operated valves in response to small changes in the controlled pressure. Adjustment of the controlled pressure is made by adding weights or removing them from the lever of the regulator. Minute changes are accomplished by repositioning the sliding weights.

Bus Disconnect Switch

L-14 A manual bus disconnect switch, offered by **Burndy Corp.**, Norwalk, Conn., permits the substation to operate while equipment is being repaired or maintained. The design permits its use in confined spaces at a considerable saving in structural steel and foundation costs and eliminates periodic maintenance. It does not require

Municipal generating station at Zeeland, Mich.

New F-M 2800-hp. dual-fuel diesel, installed in Oct. 1957.



Even with poor load factors

new F-M dual-fuel diesel cuts fuel costs 21% for Zeeland plant!

From July through October 1958, this 2800-hp. Fairbanks-Morse dual-fuel diesel produced 71 percent of the 4,502,000 kw. hr. generated at the Zeeland, Michigan municipal plant.

The big Model 31AD18 engine averaged 5.74 mills per kw. hr. for this period—bringing average fuel cost for the plant down to 6.52 mills from an average 8.24 the previous year, a 21 percent reduction in fuel costs! The figures are even more impressive when it is realized the F-M diesel was operating at poor load factors, often well be-

low 50 percent. Despite this disadvantage, F-M dual-fuel design made the operation profitable—even with gas costing 45¢ a thousand cubic feet and pilot oil 12.5¢.

Outstanding economy and dependable performance of six Fairbanks-Morse diesels in the plant are paramount in Zeeland keeping residential rates among the lowest in Michigan—averaging 2.3¢ a kw. hr. for the last fiscal year. For information, write Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.



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Products manufactured
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special mountings and permits easy installation.

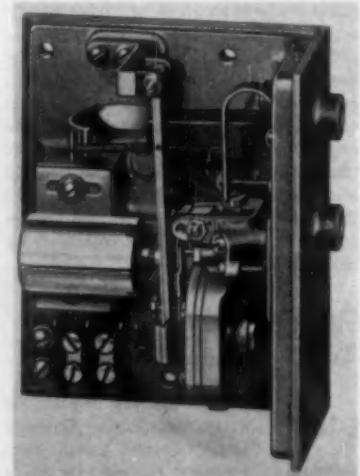
This new bus disconnect switch utilizes two double-ended socket clamps coupled to the ends of the



tubular bus. A sliding copper rod joins the socket members. In order to open the disconnect and sectionize the bus, the bolts of the socket members are loosened, and the sliding rod retracted through one socket member into the hollow tubular bus a predetermined distance governed by the stop plate attached to the rod. To close the switch, the tubular rod is extended and bolted to the other socket member. The bolts are designed with special shoulders that expand the connector and prevent binding. The disconnect may be operated by using standard hot line equipment.

Load Limiting Relay

Positive protection against overloading of motors is provided by the V-26 Load Limiting Relay, manufactured by Johnson Service Co., Milwaukee 1,



Wis. Designed for use with pneumatic control system, it can be applied to all makes of centrifugal refrigeration compressors and to fans, pumps, and electrical heating systems.

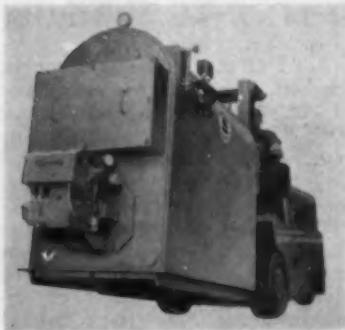
The new relay consists of an electrical element, a standard Johnson direct acting proportional action pneumatic relay, and a feedback element. The latter assures maximum stability and performance.

The V-26 can be adjusted for any current value between 3 and 7 amperes. With the proper current transformer, the load limiting relay can be used to control motors of any size.

For centrifugal compressor applications, the relay is connected in the control line to the suction damper operator and limits the output capacity of the compressor to the full load motor ampere rating.

Forced-Draft Packaged Boilers

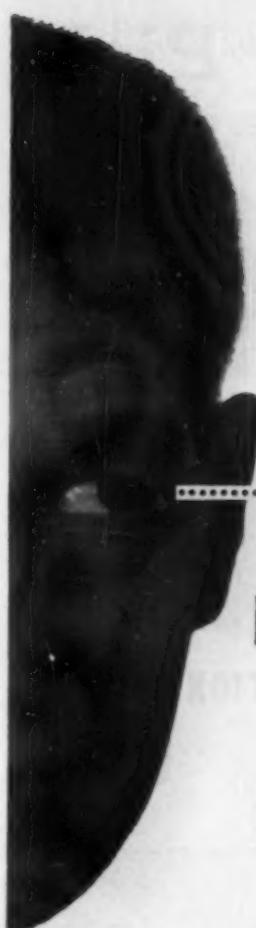
A new line of Kewanee L-16 Square Heat packaged commercial and industrial boilers which feature forced-draft firing is now available from American-Standard Industrial Division, Detroit 32, Michigan.



Designated Square-Heat Type RF units, the new packages cover a range of SBI net ratings (steam) from 1,010 to 5,620 square feet and water from 243 to 1350 MBH. The forced draft-burner fires natural, mixed or L.P. gas or No. 1 or No. 2 fuel oil or combination gas/oil. The burner and all controls are installed and wired at the factory.

One important feature of the new units is a front-mounted control panel that provides a selector switch for instant fuel changeover on combination gas/oil units. In addition to conventional safety controls, an air-flow safety switch delays firing until the forced draft blower is operating at correct speed.

(Continued on Page 78)



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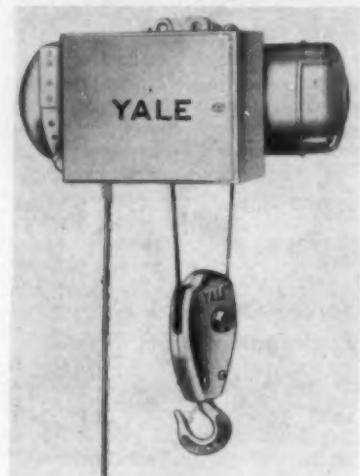
In Canada: Brook Electric Motors of Canada Ltd.,
250 University Ave., Toronto, Ont.



CATAWISSA VALVE & FITTINGS CO.
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A-C Electric Hoist Control

L-17 A new A-C electric hoist control, the Selectron, has been designed by Yale Materials Handling Division, The Yale & Towne Manufacturing Company.



11000 Roosevelt Blvd., Philadelphia 15, Pa., to permit operation of hoists from slow creep to full speed under no load or full load at near absolutely constant speeds.

Heart of the system is a simple, low-cost, rugged squirrel cage motor in conjunction with conventional control components which are easily replaceable and require no involved presetting to obtain optimum performance.

The compact control unit requires no secondary controls, accelerating relays or load resistors, thereby eliminating any problems of dissipating heat.

The Yale Selectron control, applicable to the Yale Cable King line of $\frac{1}{4}$ ton to 15 ton hoists, operates through five speeds under constant positive control of the hoist operator.

Gear Reducers

L-18 A line of standard gear reducers with mounting facilities to accommodate separate, coupling-connected standard motors of suitable horsepower, speed and electrical characteristics has been announced by The Lima Electric Motor Co., Inc., Lima, Ohio, a subsidiary of Consolidated Diesel Electric Corporation.

These new gear reducers are available for horizontal foot mounted

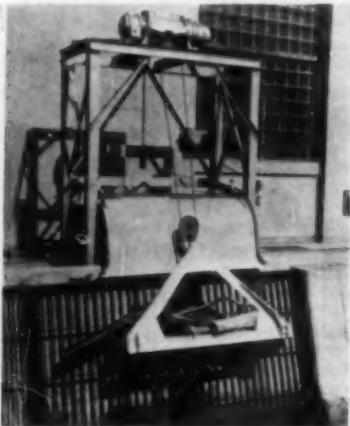
application, in either double or triple reduction units; double reduction units have a horsepower range



of 1 through 125 horsepower, with reductions from 230 to 45 rpm. Triple reduction units range from 1 to 50 horsepower, with reductions from 37 to 7½ rpm. The gear reducers are all equipped with an exclusive spline drive pinion which permits quick ratio changes without complicated disassembly.

Trash Rack Rake

L-19 A new trash rack rake, which helps reduce head and power losses resulting from clogged water intakes, is now available from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Called the



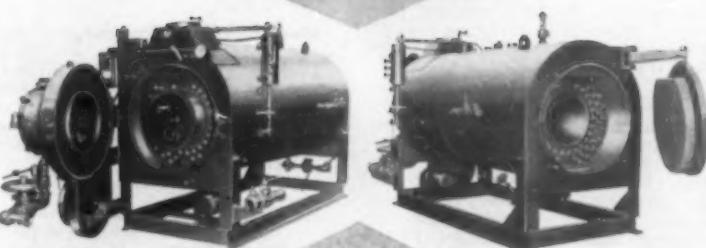
Leonard trash rake, the device is used to remove leaves, grass, roots, branches, and other materials from trash racks that protect water intakes at power, sewerage and water supply plants.

The rake is used on all kinds of stationary intake rack structures which have either inclined or vertical rack bars. One of its outstanding characteristics is its ability to ride down over stubborn obstructions and work them free.

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- simplified design eliminates need for highly skilled personnel

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MAINTENANCE—TOOLS EQUIPMENT & METHODS

2—Electrical Maintenance — New contract service (for Southeast only) inspects and tests motors, generators, gearing, control and distribution systems, etc., at a cost less than 1% of value of equipment. — Atlanta office of WESTINGHOUSE ELECTRIC.

4—Spotcheck — You can save time, money and labor in finding cracked parts quickly and easily with this \$36.00 Spotcheck Kit — a dye penetrant inspection technique. Bulletin describes complete fire-safe materials and kit. — MAGNAFLUX CORP.

15—Stress Relieving — Data sheets describe medium frequency (1200 to 12,000 cycles) induction heating equipment for stress relieving of weldments and shrink fitting. Mobile power converters and special cable. — BROWN-BOVERI.

17—Mechanical Packings — 32 p Cat. PC-103 describes a variety of packings and gaskets, including self-lubricating, sheet and molded packings, etc. Includes application charts and price information. — GREENE, TWEED & CO.

18—Maintenance Ideas — 4-page folder highlights 90 ways Kano Kroil and other products can help the man-in-the plant. — KANO LABORATORIES.

22—Lubricator Alert — Data sheet describes lubricator flow switch that indicates positive flow at terminal points on any force feed lubricator system. Easily installed on any existing application. Indicates lack of flow to the point of injection. — MANZEL.

32—Scale Removal — Data sheet on Kwik-Kleen, a completely safe method of rapid scale removal for heat transfer surfaces. — THE NORTH AMERICAN MOGUL PRODUCTS COMPANY.

33—Air Compressor Rod Packing — Catalog 56 shows how "Compressor" No. 760 stays flexible under intense dry heat and protects rods from premature wear. — THE BELMONT PACKING & RUBBER CO.

45—Correct Lubrication — "Lubriplate Data Book" shows importance of providing and maintaining proper and economical maintenance of all types of plant machinery through adequate lubrication. — FISKE BROTHERS REFINING CO.

53—Steam Line Treatment — Folder describes alkaline IPCO S-L-T. Used in boiler water, it will volatilize and travel with steam to return lines. Prevents costly repairs and provides insurance against replacing pipe and fittings. — IPCO LABORATORIES, INC.

70—Multi-Purpose Grease — Bulletins describe new single product Gulfrown grease (4 consistencies) that does the work of many—simplifies application and avoids errors, reduces inventory and cuts lubrication costs; grease gun or centralized system application. — GULF OIL CORPORATION.

78—Control Heat & Glare — New folder tells how Sun-X Glass Tinting (transparent alkyd-based liquid plastic by du Pont) is applied directly to existing glass by flow process without spray or splatter. Bonds tightly. Wash in usual manner. — AMERICAN GLASS TINTING CORP.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

107—Proportioning Pumps — 4 p brochure illustrates and describes company's proportioning pumps and package chemical feeding units. Includes applications and specifications. — BIRD ARCHER CO.

122—Industrial Fans — Bulletin 702 covers Type XL fans for air and material handling. Volumes to 130,000 cfm pressures to 18" SP. Catalog 855 describes Pressure Fans. Volumes to 12,000 cfm, 10' to 50' SP. — CLARAGE FAN CO.

132—Glassed Centrifugal Pumps — 12 page Bulletin 725.2 describes line of glassed pumps for handling corrosive acids and alkalies. Every part of pump exposed to liquid has a tough glass surface. Specification, ratings, dimensions. — GOULDS PUMPS, INC.

143—Chemical Feeders — 36 p Bul. 1136 describes metering pumps — types, construction, displacement

and operating pressures. Gives handling recommendations for chemicals, acids, etc., and volumetric conversion tables. — MANZEL.

160—Boiler Feed Pumps — 12 p Bulletin 122 describes and illustrates the type BFI high pressure pumps. Design features, service ratings and engineering data included. — PACIFIC PUMPS, INC.

185—After Cooler — Bulletin 130 shows how the Aero unit removes moisture from compressed air or gases; cools water for jackets and intercoolers; cools air or gases in both power and process systems; and protects air tools and pneumatic systems from water damage. — NIAGARA BLOWER COMPANY.

169—Airfoil Fans — Bulletin No. 179 covers complete line of Airfoil mechanical draft fans for forced and induced draft featuring wide range of pressure-volume ratios, high efficiency, low noise level, rugged construction. — GREEN FUEL ECONOMIZER CO.

189—Air Traps — Bulletin 289 describes ball float traps for draining water from air, gas or steam lines, or for draining light liquids from gas under pressure. Physical and selection data, prices, etc. — ARMSTRONG MACHINE WORKS.

INSTRUMENTS—METERS CONTROLS—REGULATORS

201—Valves & Gages — Handy guide No. 36 gives data and prices on valves, liquid-level gages and accessories for process and power industries. — PENBERTHY MFG. CO.

206—Process "Indicator" — Cat. 100 B shows how you can have maximum info on all process variables with Panalarm annunciators. Trouble anywhere is signalled instantly — before it can grow big and expensive. — PANELLIT, INC.

212—Automatic Temperature Control — Data sheets describe versatile automatic indicating temperature control, offering many sequence combinations—step-heating, heating and cooling, wide limit control, or temperature control plus operation of signal devices. — SARCO COMPANY, INC.

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Bulletins (Cont.)

218—Liquid Level Controls — Selection chart of "in stock" displacement type magnetrols. Details pump controls and low or high level alarm controls. Wide range specific gravity settings; standard length stem can be cut in field to job requirements. — MAGNETROL, INC.

222—Pressure Regulators — Catalog No. 77 illustrates and describes application, operation and specifications for a complete line of reducing, back-pressure and pump-pressure regulators. — MASON-NEILAN.

228—Fuel Cut-Outs & Water Level Alarms — Brochure D2 — Electrode type equipment for installation on water columns to provide fuel cut-out, high and low water level alarms and pump cut on and off. For pressures to 2500 psi. — RELIANCE GAUGE COLUMN CO.

235—Liquid Levels — Bulletin 532 describes indicator which gives a reliable, automatic reading of storage tank contents. 20" dial in 3" 10" case saves panel space. No outside power source needed; can be located up to 250 ft from tank. — THE LIQUIDOMETER CORP.

253—Combustion Analyzer — 4 p Specification E65-5 describes the "Heat Prover" which indicates per cent by volume oxygen and combustibles present in exhaust gases from all types of boiler and industrial furnaces. — BAILEY METER COMPANY.

281—Control Valve — 8 p Bul. J-170 describes sliding gate and plate control valves available. Includes engineering data, cutaway drawings, features, application information, dimensional drawings, flow capacities, rating charts, flow curve and sample specifications. — OPW-JORDAN.

291—Pneumatic Loading Stations — New Line of auto-manual units of non-seal type described in Bulletin 1031. Applicable to combustion control, feedwater regulation, pressure-reduction systems, desuperheating stations in steam power plants. — COPES-VULCAN DIVISION.

PLANT CONSTRUCTION—WELDING EQUIPMENT—SPECIALTIES

300—Fact Folders — 23 up-to-date industrial fact-file folders on aluminum, steel, copper, stainless steel, insulation, roofing and other industrial supplies immediately available from 9 Southern warehouses. — REYNOLDS ALUMINUM SUPPLY CO.

301—Vacuum Cleaning Systems

How portable and stationary systems cut costs and increase plant efficiency shown in Booklet P8 and AB-100. Eight heavy duty units (1½ to 15 hp) for cleaning hard to get at areas, reclaiming valuable materials, etc. — U. S. HOFFMAN MACH. CORP.

307—Condensate Drainage Control

Publication 6025 describes units for improving quality of heat transfer in process equipment through continuous return of condensate to boiler at high temperature and pressure. Lists many cases substantiating claim for increased heat transfer, more production with less fuel. — COCHRANE CORPORATION.

310—Incinerator — Metal cased, insulated, refractory lined incinerators for industrial and commercial use. City smoke code approved. Fast, economical installation — any size and capacity. — NORTH STATE PYROPHYLITE CO.

317—Drier Compressed Air — Bulletin 130 shows how Aero After Cooler cools compressed air or gas below temperature of surrounding atmosphere; no further condensation in your air lines. Installed outdoors. Saves cooling water. Gives better operation of air-operated tools, etc. — NIAGARA BLOWER COMPANY.

319—Portable Band Saw — Bulletin describes the Kalamobile, a portable metal-cutting band saw. Has rubber-tired 12" wheels and telescoping handles. Capacity 6" rounds - 10" flat. — Machine Tool Div., KALAMAZOO TANK AND SILO CO.

322—Heat Transfer Cements — Engineering Data Book 502 includes calculations, estimating and installation procedures on properties and uses of Thermon heat transfer cements. Contains complete list of Southern engineering representatives. — THERMON MANUFACTURING COMPANY.

323—Mercury Vapor Fixture — Industrial color corrected units described in Bulletin 401. "Stabilux Socket" secures bulb end of lamp, eliminating lamp rupture and breakage from vibration. — WIDE-LITE CORP.

324—Painting New Plants

"Plan Painting of New Plants to Reduce Costs" describes how company's lead-suboxide paints can save 1 or 2 coats of paint on new plants. Eventual repainting costs are cut as well since these paints form a dense, metallic lead film which can be recoated without expensive scraping, sanding or repriming. — SUBOX INC.

334—Storage Racks

Bulletin 17SP shows how Rackmaster Fittings cut rack-building time as much as 60% by eliminating threading and welding. Pipe 100% salvagable. — THE HOLLANDER MFG. CO.

335—Classifying Systems

Bulletin explains general operating characteristics of centrifugal and gravitational type classifiers. Curves illustrate high efficiencies achieved in actual installations and indicate particle size distribution of incoming feed, separated fines and coarse material. — BUELL ENGINEERING CO., INC.

336—Retaining Walls

Catalog RW 3555 shows how bin-type walls stabilize slopes and gain valuable ground for buildings, parking areas; all metal cellular construction; all-bolted assembly means small crews can do the job. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

342—Power Roof Ventilators

Bulletin 550 describes V-belt driven centrifugal type power roof ventilators. Pressures to 2" SP; capacities from 1500 to 26,500 cfm. — CLARAGE FAN CO.

348—Building Drainage

64 p bulletin describes the advantages of 4-D wrought iron for soil, waste, vent and downspout piping. Includes sections on corrosive conditions, comparative service, costs, Durham systems, and photographic surveys on vent corrosion. — A. M. BYERS CO.

366—Rigid Frame Buildings

8 page bulletin "Dixie Steel Rigid Frame Buildings" — low cost, flexibility of design, durability, and minimum maintenance; also triangular or bow-string truss all-steel roof systems; fabricated for rapid erection. — ATLANTIC STEEL COMPANY.

PIPING—VALVES—FITTINGS STEAM SPECIALTIES—TRAPS

402—Forged Steel Valves

General Purpose Valves, Supplement No. 1 to Catalog F-9, covers gate, globe and angle valves. ½" through 2" sizes, for 150-800 pound service. Featuring 13% chrome stainless steel trim with hard facings. — HENRY VOGT MACHINE CO.

403—Valve Operators

Folder shows how re-designed sprocket rim makes any valve readily accessible from the floor. Simplifies pipe layouts, prevents accidents, fits all valve wheels. — BABBITT STEAM SPECIALTY CO.

405—Temperature Problems

4 p folder "Service for Efficient Thermal Conservation" covers insulation solutions for high and inter-

Bulletins (Cont.)

mediate temperatures, heating and air conditioning-low pressure steam, and ice water and frigid temperatures. — MUNDET CORK CORPORATION.

407—Piping Materials—Bulletin reports on intensive investigation into problem of main steam piping materials and gives data on stress rupture characteristics of Types 316 and 347 stainless steel piping adjacent to welded joints. — PITTSBURGH PIPING AND EQUIPMENT COMPANY.

409—Lubricated Plug Valves—Catalog PV-4 covers operational features. Quarter-turn to open or close; lubricant grooves provide positive seal when valve is closed; when open, seating surfaces not exposed. — THE WM. POWELL COMPANY.

422—Welded Steel Pipe—40 p catalog describes applications, advantages, standard specifications, production limits, linings and coatings, fittings, joints, etc., of welded steel pipe. Data tables, drawings, and illustrations included. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

429—Expansion Joints—8 p Bulletin EJ-1915 describes Type W Gun-Pakt expansion joint which features an improved one-piece design of body and gland. Includes data on figuring expansion of pipe lines and suggestions for installing expansion joints. — YARNALL-WARING CO.

443—PVC Fittings & Flanges—Corrosion resistant polyvinyl chloride pipe fittings and flanges covered in 12 p catalog, featuring characteristics, advantages, limitations, operating pressures, temperatures, field tests, etc. — GRINNELL COMPANY, INC.

465—Water Hammer—Cause, effect and control covered in Bulletin 851. — THE WILLIAMS GAUGE CO., INC.

452—Pipe and Tubes—42 page Bulletin 26 gives types of steel tubes, tensile, creep and rupture properties, welding and forming data, applications and other valuable data. — National Tube Div., UNITED STATES STEEL CORP.

463—Stainless Steel Valves—Catalog 59 SS describes complete line of gate, globe and swing check valves with full details of valve patterns in alloys that satisfy requirements of most corrosive services. Includes section to show degree of resistance of alloys to many cor-

rosive media under varying conditions. — JENKINS BROS.

466—Pipe Insulation—Folder describes Superglas with "hinged action" — mfg. in one-piece, full length sections open easily to speed installation; easy cutting and fitting; temperature limit is 350 F. — MUNDET CORK CORPORATION.

BOILERS—STOKERS TURBINES—BURNERS

501—Package Boiler—New compact, low cost package unit (oil or gas fired) for small space requirements is described in Bulletin DK-1. Pressures to 325 psi, steam capacities to 45,000 lb/hr. — E. KEELER CO.

504—Steam Generators—Bulletin AXY-1 describes auxiliary equipment and design features of the Amesteam Generator for sizes 10 through 600 hp and illustrates how this integrated design reduces cost and increases life and reliability. — AMES IRON WORKS, INC.

KEEP-UP-TO-DATE USE SPI READER SERVICE

505—Refractories—Paco High Heat Duty and Super Duty Plastic Refractories. Fire brick, high temperature cement, castable. Installation and engineering service. Free estimates and inspection. — NORTH STATE PYROPHYLITE CO.

506—Package Boilers—Practical construction with Continental two pass design described in Bulletin BE100. Units range in size from 20 to 600 hp; 15 to 250 pressures burning oil, gas or combination. — BOILER ENGINEERING & SUPPLY.

509—Free Coal Counseling—General information on how Coal Bureau engineers will advise on selection, transportation and utilization of the right coal for your purpose. — NORFOLK AND WESTERN RAILWAY.

516—Small Boiler Performance—4 p Bulletin shows how the packaged Ljungstrom air preheater boosts performance. Boilers as small as 25,000 lb/hr can have advantages of regenerative preheating—saves fuel, boosts output, and permits use of lower grade fuels. — THE AIR PREHEATER CORPORATION.

520—Perfect Spread Stoker—Complete, automatic coal firing unit in sizes from 175 hp to 350,000 lb of steam per hour and upward; top efficiency with both low and high ash coals; exclusive conveyor feeder that won't clog, and provides even distribution and continuous feeding. — AMERICAN ENGINEERING CO.

530—Coal Plant Specifications—64 page brochure, including 5 drawings, is a comprehensive guide for preparing specifications on coal-fired, low-pressure heating plants in the size range of 750,000 to 5,500,000 Btu/hr. All aspects affected by choice of fuels from storage bin to stack design covered fully. — BITUMINOUS COAL INSTITUTE.

531—Fuel Oil Treatment—Data sheet describes how Mogul treatment disintegrates, dissolves and disperses sludge in fuel oil storage tanks and equipment. Through sludge dispersal, maximum vaporization and combustion are possible. — THE NORTH AMERICAN MOGUL PRODUCTS COMPANY.

532—Economical Steam—Forced draft, pressurized gas or oil fired units described in SB-59 catalog. Two-drum water tube units include steam trim, draft equipment, burner and combustion safety controls. — ERIE CITY IRON WORKS.

535—Unit Steam Boilers—Catalog AD-100—Gives complete information on oil and gas fired "Self Contained" boilers, 15 to 500 hp, 15 to 250 psi for processing and for heating. Gives features, applications, efficiencies, capacities and dimensions. — CLEAVER-BROOKS CO.

539—Industrial Burners—How to keep heating costs low with Hev-E-Oil commercial-industrial burners described in literature SPI-859. Models from 5 to 150 gph; automatic, electronic controls; Hev-E-Duty power gas burners and combination gas/oil burners from 720,000 to 21,000,000 Btu. — INDUSTRIAL COMBUSTION, INC.

571—Oil Fired Furnaces—The Custom Mark II horizontal instant draft furnace described in Form 5973A. Forced warm air heating units, ideal for commercial and small mfg. plants, can be suspended overhead. Built-in self-powered draft fan valuable in single story buildings. — IRON FIREMAN MFG. CO.

ENGINES—DRIVES POWER TRANSMISSION MATERIAL HANDLING

600—Conveyor Idlers—Bulletin SI-116 describes pre-lubricated "UST" Conveyor Idlers. Incorporating Timken bearings and Garlock Klozures, construction permits operating without lubrication for 1-3

years or more. — CONTINENTAL GIN COMPANY.

601—Crane Runway Rails — Catalog gives information on crane rails, angle bars, crane stops, rail clips, hook and anchor bolts, bearing plates. Also specifications on various sizes of crane rail clips and explains how to order rails. — L. B. FOSTER CO.

602—Pneumatic Ash Conveyors — Bulletin S57-A describes pneumatic ash conveyors for rugged, wear-resistant pipe and fittings that provide lower maintenance cost per ton of ash covered. — NATIONAL CONVEYORS CO. INC.

610—Flexible Couplings — All metal couplings described in Catalog 51A have no wearing parts; offer freedom from backlash, torsional rigidity; free end float; smooth continuous drive; and visual inspection in operation. — THOMAS FLEXIBLE COUPLING CO.

618—Casters & Wheels — Featuring "Lockweld" steel casters with a king-pin, Cat. C-57 describes full line of industrial wheels manufactured and distributed from Rome, Ga. plant. — THE FAIRBANKS CO.

630—Mechanical Vibrating Conveyors — Catalog 890 gives information on conveyability and density of typical solid materials and provides data on how to "Do It Yourself" to get required length. — JEFFREY MFG. CO.

634—Gear Requirements — 8 page catalog describes equipment and facilities available to meet your most exacting gear requirements. South's leading gear, gear products, and power transmission equipment manufacturer. — VIRGINIA GEAR & MACHINE CORP.

WATER TREATMENT—HEATING & AIR CONDITIONING—DUST & FUME CONTROL—REFRIGERATION

702—Water Conditioning — Bulletin 611C, 20 p describes manual and automatic softeners, zeolites and ion exchange resins, mixed-bed and multi-column deionizers, dealkalizers, ion exchange systems, filters and purifiers, and water treating chemicals. — ELGIN SOFTENER CORPORATION.

703—Air Conditioning — Bulletin 122 describes and illustrates operation and suggests applications for air conditioning method that controls humidity to 1% rh and temperature to 1 F (up to 140F) with accuracy, independent of moisture sensitive instruments. — NIAGARA BLOWER CO.

705—Test Your Tower — Bulletin offers simple, proved method by which you can determine how closely your actual tower performance measures up to specified performance. Particularly applicable to operations geared to temperature of process cooling water. — THE MARLEY COMPANY.

707—Mech. Dust Collector — Aerodyne dust collector described in Bulletin 171 combines high efficiency collection with very low draft loss and extreme flexibility of installation. — GREEN FUEL ECONOMIZER CO., INC.

KEEP-UP-TO-DATE USE SPI READER SERVICE

711—Refrigeration Condensers — Bulletin RC-2 shows how Voge condensers step up rate of heat transfer and step down head pressures. Closed type for clean waters; film type where water is hard and forms scale. Units save power and refrigeration cost. — HENRY VOGT MACHINE COMPANY.

713—Electric Precipitators — 26 page Bulletin 104 shows how units meet five engineering requirements — Positive control of gas flow; high, uniform electrode emission; Effective continuous cycle rapping; and Safe, trouble-free high voltage equipment. Gives 9 time-tested steps to a successful installation. — BUELL ENGINEERING COMPANY.

716—Dust Collection — Whether nuisance elimination or process material recovery, check on Whirlex Dust Collector Units. Engineering data available. — THE FLY ASH ARRESTOR CORP.

727—Algae Inhibitor — Algicide bulletin describes simple, effective and economical way to get rid of algae troubles in humidifiers, air washers, condensers, heat exchangers, and other systems where water is exposed to atmospheric contamination. — THE NORTH AMERICAN MOGUL PRODUCTS CO.

784—Cooling Equipment — Bulletin 80-D describes company's complete line of commercial and industrial equipment—operating principles, design features, etc. — FRICK CO.

771—Water Treatment — 4 p brochure points out company's 8-point water treatment coverage for

elimination of scale, sludge, corrosion and impure steam. — IPCO LABORATORIES, INC.

ELECTRICAL

801—Motors — Bulletin describes and catalogs more popular a-c motors from 1 to 600 hp, for every process and manufacturing requirement. Single phase and polyphase; surpass NEMA specifications. — BROOK MOTOR COMPANY.

806—Motor Control — Condensed price catalog lists commonly used motor control up to and including Size 4 rating, plus push buttons, limit switches and other accessories. — ALLEN-BRADLEY CO.

809—Capacitor Selection Guide — 6 p Folder GED-3687 gives tables for choosing proper ratings of switched shunt capacitors for modern induction motors. Covers motors of all standard types, enclosures, and nominal speeds, 220-4000 v, 2-500 hp. — GENERAL ELECTRIC CO.

813—600-Volt Wiring — How Anaconda Densheathe 900 offers long life, high heat and moisture resistance, chemical stability and easy installation is described in Bulletin DM-5612. — ANACONDA WIRE & CABLE CORP.

820—Electrical Maintenance — New contract service (for Southeast only) inspects and tests motors, generators, gearing, control and distribution systems, etc., at a cost less than 1% of value of equipment. — Atlanta office of WESTINGHOUSE ELECTRIC.

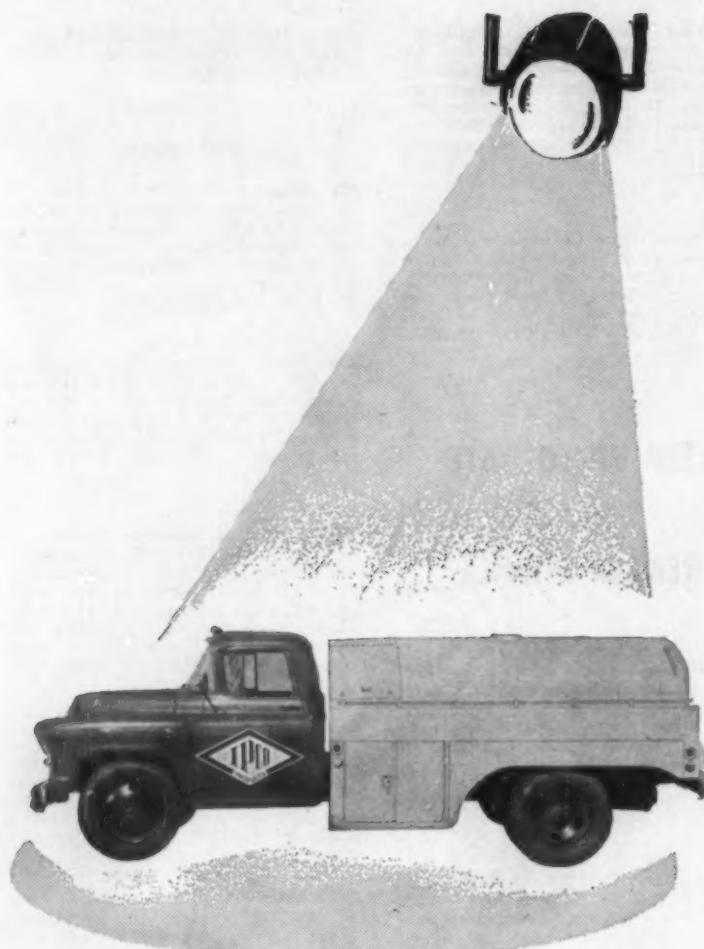
842—Circuit Protection — Bulletin FIS describes the maintenance free Fusetron fuses which protect motors, solenoids, coils and transformers against burnout, and which increase production by eliminating needless blows. — BUSSMANN MFG. CO.

855—Wiring Analyzer — 4 page bulletin describes Model 301 Adequate Wiring Analyzer which quickly, simply and easily tests wiring without confusing calculators or slide rules. — SPRAGUE ELECTRIC COMPANY.

862—Motor Starters — Manual, auto-transformer type recommended where characteristics of driven load or power company rules require reduced voltage starting. Details in Bulletin 646. — ALLEN-BRADLEY.

Late Bulletins

(Continued on Page 86)



ON-THE-SPOT SERVICE

Eliminate the danger of insurance suspension because of scale. With the new mobile service tank truck available from IpcO Laboratories, the solution to your emergency scale cleaning problem is only minutes, or, at most, hours away. No work stoppage is necessary under most conditions, since IpcO Laboratories emergency mobile unit operates while your plant is non-productive. When scale or corrosion deposits create an insurance hazard or efficiency loss in your steam-water system, call for IpcO Laboratories Emergency Maintenance Tank Truck.

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2710 APPLE VALLEY ROAD, N. E.
ATLANTA 19, GEORGIA

Late Bulletins

Z-1—Miniaturized Lubricating —

Bulletin 816, 4 pages, describes a miniaturized injector system for automatic lubrication of production machinery, which pre-measures and injects fluid lubricants in automatic cycles as often as every minute and in quantities as small as 1/135 of a drop. — LINCOLN ENGINEERING COMPANY, Industrial Division, 4010 Goodfellow Blvd., St. Louis 20, Mo.

Z-2—Industrial Pumps —

Bulletin 350, 6 pages, gives information on propeller and mixed flow pumps, with cutaway drawings, installation sketches and measurements, delivery and performance tables, and applications. — LAYNE & BOWLER, INC., Memphis 8, Tenn.

Z-3—Annunciator Systems —

Catalog 100C, 52 pages, covers function and applications of 12 annunciator systems, with engineering data, selection and ordering information. Equipment photographs, charts, diagrams. — PANALARM DIVISION, PANELLIT, INC., 7401 N. Hamlin Ave., Skokie, Ill.

Z-4—Centrifugal Compressors —

Bulletin 16B6048C, 12 pages, describes three styles of single-stage scroll casing centrifugal compressors; includes bearing and shaft seal arrangements and impeller chart. — ALLIS - CHALMERS MFG. CO., Milwaukee 1, Wisc.

Z-5—Two-Pass Unit —

Bulletin B-3232, 4 pages, includes design details, specifications and range of sizes in the Trojan series, with special features of the 2-pass unit for heating and power. — TITUSVILLE IRON WORKS, Titusville, Pa.

Z-6—D-C Motor Line —

Bulletin SB-182 gives specifications for new line of d-c motors and generators which feature interchangeability, rating for rating, with corresponding NEMA a-c induction motors, in frame sizes from 180 through 580. — MARATHON ELECTRIC MANUFACTURING CORP., Wausau, Wisc.

Z-7—High Voltage Applications —

Bulletin GEZ-2910, 12 pages, describes complete line of transformers, reactors, power supplies, modulators and other components for high voltage applications in the electronics industry. Illustrated. — GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y.

Z-8—Steel Pulley —

Bulletin 558 features comprehensive technical and engineering data, specifications, diagrams and illustrations on the Curve Crown all steel pulley. — STEPHENS-ADAMSON MFG. CO., Ridgeway Ave., Aurora, Ill.

Z-9—Heating Coils — Bulletin No. HC-102, 32 pages, gives detailed construction and operation description of Kennard/Nelson heating coils. Graphs, charts and illustrations for standard steam, hot water, steam distributing and double distributing coils. — AMERICAN AIR FILTER CO., INC., Dept. PD, 215 Central Ave., Louisville 8, Ky.

Z-10—Magnet Wire — Booklet, "Enamelled Magnet Wires for Hermetic Motor Applications," 19 pages, is designed to help manufacturer, maintenance and repair firms, choose the correct magnet wire for hermetic motors. — ANACONDA WIRE AND CABLE COMPANY, Dept. EFL, 25 Broadway, New York 4, N. Y.

Z-11—Tape Insulation — Bulletin WC-8319 gives full technical and specification data on varnished Dacron glass insulation and the new G-E interlocked armor cable design. — GENERAL ELECTRIC COMPANY, Bridgeport 2, Conn.

Z-12—Measuring Tools — 1959-60 Guide & Catalog of Precision Measuring Tools and Instruments, 96 pages, contains complete detailed information on these products, with numerous illustrations. — SCHERR-TUMICO, 200 Lafayette St., New York 12, N. Y.

Z-13—Finishing Systems — Form F-325, 4 pages, is an illustrated index of complete finishing systems, with all equipment items needed for fully integrated installation and components engineered to work together. — THE DeVILBISS COMPANY, Toledo 1, Ohio.

Z-14—Speed Reducers — Catalog 3805, 32 pages, describes single-reduction worm gear speed reducers with a new high-load-capacity thread form and utilizing high-strength materials. Illustrations and engineering data. — DE LAVAL STEAM TURBINE CO., Trenton 2, N. J.

Z-15—Hook-on Volt Ammeter — Bulletin GEA-6292C, 4 pages, gives description, specifications and construction details of pocket-size, hook-on volt ammeters for testing a-c voltages. Applications, current ranges, accuracy percentage, operating instructions. — GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y.

Z-16—Motor Control — Motor Control Digest, 162 pages, gives descriptive, pricing, technical and engineering information on complete line of motor controls. Condensed version of electrical control price book, with quick reference selector guide. — ALLIS-CHALMERS MANUFACTURING CO., Milwaukee 1, Wisc.

Z-17—Pressure Reducing Valves — Folder, 4 pages, describes Atlas Type B pressure reducing valves, including information on installation and operation. Photographs, valve drawings, dimensions, capacity chart, illustrations of typical applications. — ATLAS VALVE CO., 280 South St., Newark 5, N. J.

Z-18—Exhaust Hoods — Bulletin 270-E2A, Vol. 2, 28 pages, has been prepared to illustrate various exhaust hoods for many different foundry operations. Contains 46 actual installation photographs. — AMERICAN AIR FILTER CO., INC., Dept. PD, 215 Central Ave., Louisville 8, Ky.

Z-19—Material Handling — Bulletin No. 76, 4 pages, has numerous illustrations to show the use of Feedrail trolley busway electrification systems in various crane and hoist installations. — FEEDRAIL CORPORATION, 125 Barclay St., New York 7, N. Y.

Z-20—Deaerating Heaters — Bulletin WC-101C, 8 pages, discusses spray type deaerating heaters, covering many aspects of the process and equipment. Illustrated with drawings and photographs. — GRAVER WATER CONDITIONING CO., Attn.: R. S. Lewis, Mgr. Sales Promotion, 216 West 14th St., New York 11, N. Y.

Z-21—Overhead Handling Systems — Bulletin C-2, 56-page catalog, features overhead handling systems of track, cranes, trolley, switches, and other electrification, as well as monorail and auxiliary equipment. — AMERICAN MONORAIL CO., 1111 E. 200th St., Euclid, Ohio.

Z-22—Recirculated Gas — Bulletin G-96, 16 pages, discusses recirculated gas as a method for obtaining the proper proportioning of heat within a steam generator, the thermodynamic effect of recirculated gas, the mixing of recirculated gas with combustion gas and its application to boiler design and operation. — THE BABCOCK & WILCOX CO., Boiler Division, Barberton, Ohio.

Z-23—Ventilator Control — Unit Ventilator Control Application Manual describes complete line of automatic control systems for hot water, steam, gas-fired, and electric unit ventilators. — BARBER-COLMAN COMPANY, Dept. 763, 1300 Rock St., Rockford, Ill.

Z-24—Speed Reducers — Book 2751, 20 pages, contains information on complete line of helical gear speed reducers; selection data; tables of load classes and service factors. — LINK-BELT COMPANY, Dept. PR, Prudential Plaza, Chicago 1, Ill.

(Continued on Page 88)



ACCURATE TEMPERATURE CONTROL of Hydraulic Liquids PREVENTS LOSSES

• This NIAGARA AERO HEAT EXCHANGER cools the liquid for a large hydraulic press, preventing heat damage to the pump stuffing boxes. Using outdoor air as the evaporative cooling medium, it removes the heat at the rate of input (1,875,000 BTU/hr.) with no cooling water consumption except a negligible amount evaporated.

Similar Niagara machines cool water, oils, solutions, lubricants and coolants for many mechanical, electrical and chemical processes. In a closed system, your coolant is never contaminated. The system is simple and easy to keep up; the equipment has a long, useful life.

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District Engineers in Principal Cities
of United States and Canada

Bulletins (Cont.)

Z-25—Primer for Seawater Immersion — Technical Letter No. 14, 4 pages, summarizes test results for a new red lead-coumarone primer for seawater immersion. — LEAD INDUSTRIES ASSOCIATION, 60 East 42nd St., New York 17, N. Y.

Z-26—Heat Exchanger Tubes — Bulletin TB-431, 8 pages, gives technical information on new line of heat exchanger tubes for use in the process industries; demonstrates quality controlled manufacturing procedures to provide good fit in tube sheets, ease of fabrication and optimum fluid flow. — THE BAB-COCK & WILCOX CO., Tubular Products Division, Beaver Falls, Pa.

Z-27—Lighting Supports. — Bulletin

G-2, 8 pages, discusses channel type lighting supports for installing wiring and electrical lighting fixtures in industrial plants and commercial buildings. — STEEL CITY ELECTRIC COMPANY, 1207 Columbus Ave., Pittsburgh 33, Pa.

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Southern News Briefs (Continued)



Mr. McElroy



Mr. Hudson

Pelican Supply — La.

Pelican Supply Co. Inc., Shreveport, La., has recently been purchased by Thomas A. McElroy and Morley A. Hudson. Mr. McElroy is President and General Manager, while Mr. Hudson serves in an ad-

visory capacity and continues to operate Hudson-Rush Co. A. W. Adkins, Assistant General Manager, Charles P. Griffin, Purchasing Agent, and Robert Hutto, Office Manager, continue in these positions. John M. Holden has been appointed Assistant Purchasing Agent.

Pelican has its main office, supply store, steel warehouse and shops in Shreveport, a branch and steel warehouse in Lake Charles, and an oil field supply store in New Iberia.

Childers — Houston

Don Ahrens has been appointed general sales manager of Childers Manufacturing Co., Houston, Tex., major producer of aluminum jacketing for insulated lines, elbows,



MOST MAJOR U.S. POWER PRODUCERS REDUCE COSTS with PANALARM ANNUNCIATORS

MAXIMUM INFORMATION on all process variables . . . the result of 10 years system engineering by Panalarm and major power producers. That's why Universal Series 50 is the power industry's most informative annunciator. Trouble anywhere is signalled instantly—before it can grow big and expensive. "Off-normals" are pinpointed instantly, accurately for fast remedial action, reducing costly "outage" losses.

Economical, highly flexible design facilitates system expansion. Can be simply adapted to your exact requirement, avoiding costly custom designing. Proven components—e. g., almost 1,000,000 dependable Panalarm developed relays have been used in Panalarm Annunciators.

Ask your nearby Panalarm sales engineer to show you why Universal Series 50 is the power industry's No. 1 annunciator choice . . . how its adaptability and reliability can help increase your profits . . . by producing maximum information and reducing costly "outages." No obligation, of course.

Write for Catalog 100 B today.



Division of

PANELLIT, INC.

7401 No. Hamlin Ave., Skokie, Ill.



towers, vessels and tanks. He formerly held a similar position with Paasche Air Brush Co. in Chicago.

Mr. Ahrens' new sales responsibilities not only include aluminum jacketing but also the distribution of prefabricated steel buildings, walkway covers and industrial-commercial carports.

Allis-Chalmers — D.C., Ga.

Appointment of J. M. Duncan as manager, Industries Group Sales, Washington office, and of B. G. Camp as manager of the Atlanta district has been announced by Allis-Chalmers.

Duncan, who had been manager of Allis-Chalmers Atlanta district since 1956, succeeds W. P. Bell. Prior to that Duncan had been a sales representative in the company's New Orleans district for five years.

Camp had been a sales representative in Allis-Chalmers Charlotte district since 1946.

Duncan and Camp are graduate electrical engineers, the former of Duke University and the latter of North Carolina State.

Trane Co. — Atlanta

E. Milton Bevington has been appointed manager of The Trane Company sales office in Atlanta, Ga. Mr. Bevington, a native of Nashville, Tenn., is a graduate engineer and has worked in the field of air conditioning sales since 1956.



E. E. Crump

E. V. Hardway, Jr.

Houston Instrument Corp. Announces Merger

The merger of Houston Instrument Corporation with Crump Instrument Corporation, Houston Magnetic Products, Inc., and Instrument Mirror Manufacturing Company has been announced.

The principals are E. E. Crump and E. V. Hardway, Jr. In the new corporate structure, Mr. Crump became vice president and director of Houston Instrument. He will con-

tinue as general manager of Magnetic Products Division and Crump Instrument Division of the enlarged Houston Instrument Corporation. Mr. Hardway is president of the corporation.

Houston Instrument will manufacture and market industrial and laboratory instruments for a wide range of industries. Headquarters will remain at 1717 Clay, in Houston, while manufacturing facilities will be at 1520 Foley in Spring Branch, a Houston suburb.

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—says THE BROWN COMPANY
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"During a seven-month period before using LUBRIPLATE No. 130-AA in the bearing of our Kraft Mill Lime Kiln, we used a conventional oil at a cost of \$2,134.00. In the seven months that followed, we used LUBRIPLATE No. 130-AA for initial filling and replacement at the cost of \$35.84."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

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For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



Philip Carey Houston, Memphis

Among five recently appointed division vice presidents for The Philip Carey Mfg. Company are C. J. Bainum and Gordon Ellis.

Mr. Bainum, who lives at 1716 North Blvd., Houston, Texas, is



Mr. Ellis

Western Division vice president. He joined Carey in 1941 and became St. Louis district manager in 1950 and Southwestern division manager in 1955.

Mr. Ellis, with headquarters in Memphis, Tenn., is Southern Division vice president. Since 1938 he had been with The Lehon Company, which was acquired by Carey in 1955, and he served as Lehon general sales manager until his present appointment.

Western Gear — Tenn.

Western Gear Corporation, Los Angeles, California announces the appointment of the Harvey John Readey Company, 966 Raines Road, Whitehaven, Tennessee, as a representative for StraitLine gearmotors, StraitLine speed reducers, and SpeedMaster reducers and high speed units. The Readey Company's territory covers the State of Arkansas, and parts of Mississippi and Tennessee.

Parker-Hannifin — S.C.

Appointment of Poe Hardware & Supply Company, 556 Perry Avenue, Greenville, South Carolina as a distributor for industrial tube and hose fittings is announced by Parker-Hannifin Corporation, Cleveland, Ohio.

These products will be stocked in substantial quantities, according to Jim Hardy, sales manager of Poe,

Largest Merchant Iron
Producer in U. S. Chooses

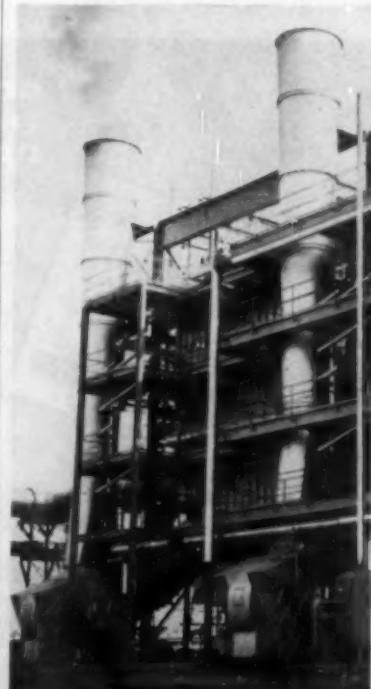
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Fan Wheel Assures
Longer Life . . .
Minimum Maintenance

The largest furnace in the country producing merchant pig iron was recently placed in service as part of an expansion program by a major Southern mill. The new furnace has a rated capacity of 1000 tons per day and is one of the most modern in the country with respect to mechanization and automatic controls.

Because of their unique design and high erosive resistance, WHIRLEX heavy duty draft fans were chosen to handle the hot blast furnace gas. The three units shown here carry approximately 150,000 cubic feet of gas per minute. Preliminary fan examinations show wear to be less than a third that of ordinary fans designed for this purpose.

*A Whirlex fan installation
may solve your problem.
Write or wire us.*



**Fly Ash
Arrestor Corp.**
201 N. 1st Street
BIRMINGHAM, ALA.


to assure prompt handling of customer requirements. For technical assistance on fluid-handling systems as needed, the firm has the services of H. J. McBride, Parker-Hannifin district manager of distributor sales, with headquarters in Charlotte, North Carolina.

Spear-McVey — Atlanta

John F. Spear and Charles B. McVey have announced the forming of **Spear-McVey & Company**, 3158 Maple Drive, N.E., Atlanta, Ga. The company is specializing in industrial engineering, including plant location surveys and layouts; maintenance engineering; and all phases of management and personnel planning.

Mr. Spear, former owner of John F. Spear & Associates, has lived in Atlanta for the past 12 years. He has been Chief Industrial Engineer and later Director of Personnel for Rich's, Inc. Prior to coming to Atlanta, he did engineering work for Sears, Roebuck and several other firms.

Mr. McVey has done engineering work for Eastman Kodak Company for 15 years. For the past 3 years he has been Plant Engineer, in charge of Engineering and Maintenance, for Eastman in Chamblee, Ga.

Feedrail Appoints Southern Representative

Feedrail Corporation has appointed **Murray C. Nelson** as representative for the territory covering the State of Virginia, District of Columbia, Maryland east of and including the County of Washington and the Counties of Berkeley and Jefferson in West Virginia. Offices are located at 500 Kingston Road, Baltimore 29, Md.



Mr. Lamberth



Mr. Woltz

Cooper-Bessemer — S.W.

The promotion of **Tom M. Lamberth, Jr.**, to the post of Assistant to Southwest District Manager at Dallas, Texas, is announced by **The Cooper - Bessemer Corporation**. Simultaneously, Clifton W. Woltz has been appointed to succeed him as Branch Manager of the Shreveport office. Mr. Woltz was formerly sales engineer in the Dallas office.

Cross Names Coxey — S.E.

Robert R. Coxey has been named sales engineer for the Southeastern

States by **Cross Perforated Metals, National - Standard Company**. He will be based in Charlotte, North Carolina, and will cover the coastal states South of the Mason-Dixon line.

Mr. Coxey formerly was an independent manufacturers representative and had been sales vice president of the Industrial Silica Corporation.

Federal Pacific — Ala.

Federal Pacific Electric Co. has established a district sales office in **Birmingham, Ala.**, and appointed **John N. Hulson** district manager. Located at 2803-A 19th Place, So.,

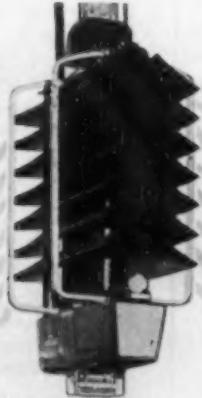


Homewood, Alabama, the Birmingham district office will service the State of Alabama as well as the northwestern section of Florida.

Mr. Hulson was previously Birmingham district manager for the **Square D Company**. A native of Bessemer, he received his electrical engineering degree from the University of Alabama.

(Continued on Page 92)

infra-red heat



CLEAN, QUICK, LOW-COST HEAT FOR COMMERCIAL AND INDUSTRIAL BUILDINGS

Overhead gas-fired Panelbloc heaters provide the perfect solution to Commercial and Industrial heating problems. Panelbloc heats with infra-red radiation, has no fans or motors — nothing to wear out — doesn't even need electrical connections or wiring. Panelbloc heat

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Bailey Meter — Tulsa

Bailey Meter Company announces the appointment of P. B. Newell as resident engineer in Tulsa, Okla., subdivision of the company's Kansas



City district. He succeeds L. E. Bartel who has been assigned to the San Francisco district.

Mr. Newell joined the company in 1951. After completion of his training, he was assigned to the Houston district, and in 1955 was transferred to Dallas.

B&W Moves Tulsa Office

The Tulsa, Oklahoma district sales office of The Babcock & Wilcox Company's Tubular Products Division has been moved to Suite 305, the Shell Building, 1810 South Baltimore, Tulsa 19, it has been announced by Leon Wohlgemuth, general sales manager for the division. The office was formerly located in the Philtower Building.

A. M. Byers — Tenn.

Tennessee York Supply Company, Nashville, Tenn., has been named a distributor of polyvinyl chloride pipe, produced by A. M. Byers Company, Pittsburgh.

Basic users of PVC pipe are the chemical and oil industries. However, the drug, pulp, food, paper and mining industries also use a considerable amount of this corrosion resistant thermoplastic material. Ernest Buchi is president of Tennessee York.

Crane Buys Chapman Valve

Crane Co. of Chicago recently purchased all properties and assets of The Chapman Valve Manufacturing Company, located at Indian Orchard (Springfield) Massachusetts. The sale price of \$11,197,377 was approximately book value. The plant, to be known as The Chapman Valve Manufacturing Company, is a wholly-owned subsidiary of Crane. It will retain its present management and executive staff, headed by C. Goodwin Carter.

Instrumentation for Water Treatment Plants

(Continued from Page 43)

filter tape contains a series of evenly spaced circular dots about the size of a five-cent piece. Each dot is made up of the residue of the filtering test and can be identified by a time printer which prints the time at which the sample was taken.

With this type of instrument many more feedwater samples can be filtered and analyzed than a full-time man could accomplish. At the present stage of development, the plant operator can quickly scan the readings on his filter tape to search out abnormalities.

Further development will be along the line of photoelectrically examining the filter tape either by reflectance or transmittance so that an automatic alarm or control

could be energized.

Uses for this filter tape analyzer will probably extend to many fields. At present it is being used to check on the clean-out procedure of a supercritical once-through boiler cycle prior to the start-up of the power generating station.

Summary

The purpose of this article has been to present in fairly broad terms the type of instrumentation and automatic controls that the water treatment industry is using today, and also to show how our thinking has developed and changed over the years.

Instrumentation as it applies to the water treatment industry is

PERSONNEL WANTED FOR TENNESSEE PLANT

For 500 ton Kraft linerboard mill being built at Counce, Tennessee. Mill is located on Tennessee River just below Pickwick Dam, an area of pleasant living conditions with excellent recreational facilities. Mill is scheduled for operation January 1, 1961; however, we wish to fill the following positions immediately so that the men chosen can be in on the planning and installation stages.

POWER SUPERVISOR — Must be able to plan and organize Power Department; help select and train men; plan and direct efficient and safe operation of power and recovery boiler and related equipment. Will supervise combination gas and bark fired boiler and large recovery unit. Will report to Pulp Mill Superintendent. This position offers excellent opportunity for a competent power man to increase his knowledge of pulp mill operations, or to grow in the power plant field, as the mill expands.

Only well qualified men with Southern experience will be considered.

Tennessee River Pulp & Paper Company
P. O. Box 33, Counce, Tenn.

MECHANICAL ENGINEER

Our Engineering Department is looking for a Mechanical Engineer with a Heat - Power background and design experience. This is a good opportunity with a reliable firm which has had continued growth. Our plant is located in Southeastern North Carolina near several beaches and other recreational facilities. Salary commensurate with ability and experience. Write to:

Personnel Department
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NORTH WALES, PA.

no more static than in other progressive fields. Ways are constantly being sought to improve the reliability of automatic control systems and the reproducibility of the results obtained with them.

Water treatment equipment manufacturers should produce many striking innovations in the future which will enable this field to advance at an even greater rate than it has in the last ten years.

Job Evaluation

(Continued from Page 37)

also afforded the opportunity of putting themselves in the other fellow's shoes.

This program was implemented in the fall of 1953. It was thoroughly reviewed in the fall of 1956, when all jobs were critically considered as to their proper setting where definite changes had been made in working conditions and other factors. This plan has stood the test of time and contributed to the understanding and workability of the plant's wage policies.

Participation was the key to acceptance of the program. Understanding was brought about by a continuous effort to keep all employees informed of the progress of the evaluation. Employees who participated in the actual ranking were able to go out and tell their fellow workers that every job had been considered fairly. Thus, step by step, factor by factor, the program of evaluation literally sold itself.

Similar Job Evaluation Programs have been installed in Georgia, North Carolina, Illinois and Texas. Here again they have added to understanding, increased satisfaction and improved production.

**KEEP-UP-TO-DATE
USE SPI
READER SERVICE**

See Page 81

FOR WATER Softening AND Conditioning



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HOSPITAL INSTALLATION

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Index of Advertisers

This Advertisers' Index is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

A

Air Preheater Corp.	65
Allen-Bradley Co.	5
Allis-Chalmers Mfg. Co.	*
American Cancer Society	*
American Engineering Co.	59
American Glass Tinting Corp.	*
Ames Iron Works, Inc.	*
Anaconda Wire & Cable Co.	*
Anderson Chemical Co., Inc.	13
Anderson Co., V. D.	*
April Showers — Southern	*
Armco Drainage & Metal Prod., Inc.	*
Armstrong Machine Works	2
Atlantic Steel Co.	71

B

Babbitt Steam Specialty Co.	*
Babcock & Wilcox (Boilers)	26, 27
Bailey Meter Co.	17
Belmont Packing & Rubber Co.	*
Bettcher Mfg. Corp., The	*
Panelbloc Div.	91
Bird-Archer Co.	*
Bituminous Coal Institute	22, 23
Blaw-Knox Company	*
Commercial Grating	*
Blaw-Knox Co., Copes-Vulcan Div.	51
Boiler Engineering & Supply Co., Inc.	79
Boston Gear Works	*
Brook Motor Corp.	78
Brown-Boveri Corp.	*
Buell Engineering Co., Inc.	*
Business Publications Audit of Circulation, Inc.	*
Bussmann Mfg. Co.	52, 53
Byers Co., A. M.	*

C

Catawissa Valve & Fitting Co.	78
Chapman Valve Mfg. Co.	*
Charleston Rubber Co.	93
Cherry Way Corp.	*
(Hotel Pittsburgher)	*
Chesapeake & Ohio Railway Co.	*
Childers Mfg. Co.	*
Clarage Fan Co.	1
Cleva-Brooks Co.	*
Cleveland Tramrail Div., Cleveland Crane & Engineering Co.	*
Cochran Corporation	*
Condit Co., Thomas B.	*
Continental Gin Co.	73
Copes-Vulcan Division	*
Blaw-Knox Co.	31
Crescent Belt Fastener Corp.	*
Cyclotherm Division	*
National-U. S. Radiator Corp.	61

D

Dean Hill Pump Co.	*
Detroit Stoker Co.	11
Dixie Bearings, Inc.	Third Cover

E

Eastern Stainless Steel Corp.	*
Edward Valves, Inc.	*
Elgin Softener Corp.	25
Ellison Draft Gage Co., Inc.	*
Emerson Electric Mfg. Co.	*
Eutectic Welding Alloy Corp.	*

F

Fairbanks Co., The	*
Fairbanks, Morse & Co.	75
Fairmount Chemical Co., Inc.	*
Finnigan, J. J. Co., Inc.	64
Fiske Bros. Refining Co., Lubriplate Div.	90
Fly Ash Arrestor Corp.	90
Foster Engineering Co.	*
Foster Co., L. B.	93
Foster Wheeler Corp.	*
Frick Company	*

G

Garlock Packing Co.	*
Gates Engineering Co.	*
General Con. Co.	*
General Electric Co.	*
Goulds Pump, Inc.	*
Graves Tires & Mfrs. Co., Inc.	*
Green Fuel Economizer Co.	*
Greene Tweed & Co.	*
Grinnell Co., Inc.	*
Gulf Oil Corp.	*

P

Pacific Pumps, Inc., A Division of Dresser Industries, Inc.	*
Panellit, Inc.	*
Panlex Mfg. Corp.	*
Peerless Pump Divisions, Food Machinery Chemical Corp.	*
Pemberton Mfg. Co.	*
Pittsburgh Piping & Equipment Co.	*
Plibrico Co.	*
Porter, Inc., H. K.	*
Powell Valves	*

Second Cover

H

Hagan Chemicals Controls, Inc.	*
Hollaender Mfg. Co.	*

I

Illinois Water Treatment Co.	*
Industrial Combustion, Inc.	64
IPCO Laboratories, Inc.	74, 86
Iron Fireman Mfg. Co.	19

J

Jeffrey Mfg. Co.	31
Jenkins Bros.	*
Jordan Corporation	*

K

Kalamazoo Tank & Silo Co.	*
Kano Laboratories	*
Kellogg Company, M. W.	*

L

Ladish Co.	*
Leslie Co.	*
Lewis & Co., Chas. S.	*
Liquidometer Corp.	*
Lubriplate Division, Fiske Bros. Refining Co.	90

M

Magnatrol, Inc.	61
Manzel Division of Houdaille Industries, Inc.	89
Mason-Nellan Divisions	16
Worthington Corp.	*
Massey Coal Co., Inc., A. T.	*
Mathews Conveyor Co.	*
McJunkin Corp.	*
Midwest Piping Co., Inc.	*
Mundet Cork Corp.	*

N

National Business Publications, Inc.	*
National Supply Co.	*
National-U. S. Radiator Corp.	*
Niagara Blower Co.	*
Norfolk & Western Railway Co.	12, 13
Norgen Co., C. A.	*
North American Mogul Products Co.	*
North State Pyrophyllite Co., Inc.	*

O

Otis Elevator Co.	*
-------------------	---

V

Van Products Co.	*
Vogt Machine Co., Henry	*
U. S. Treasury	*

W

Want Ads	*
Webster Engineering Co.	*
Western Precipitation Corp.	*
Westinghouse Electric Corp.	53
Wide-Lite Corporation	*
Williams Gauge Co., Inc., The	*
Wilson, Inc., Thomas C.	*

Y

Yarnall-Waring Co.	49
Yuba Consolidated Industries, Inc.	*
Heat Transfer Division	*

Z

Ziegler & Co., G. S.	*
----------------------	---



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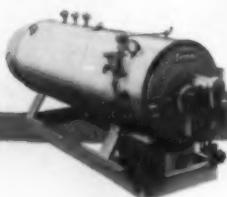
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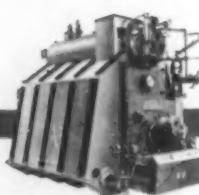
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Horizontal four-pass fire tube packaged boiler for installations where space is limited. Capacities from 20 to 350 bhp. Fully automatic, burning oil, gas or both. Equipped with dependable Superior Rotary Burners and induced draft. Pressures to 250 psi. or for hot water operation. Write for Bulletin 15-C.



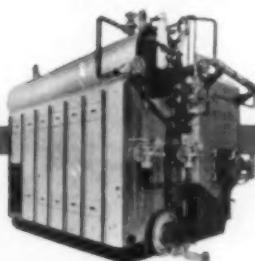
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Horizontal four-pass fire tube Type "CF" units are fully automatic, burning oil, gas or both. Capacities from 400 to 600 bhp. Pressures to 250 psi. or for hot water. Built-in induced draft for clean, quiet operation. Write for Bulletin 15-F.



TYPE "AS"

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TYPE "D"

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